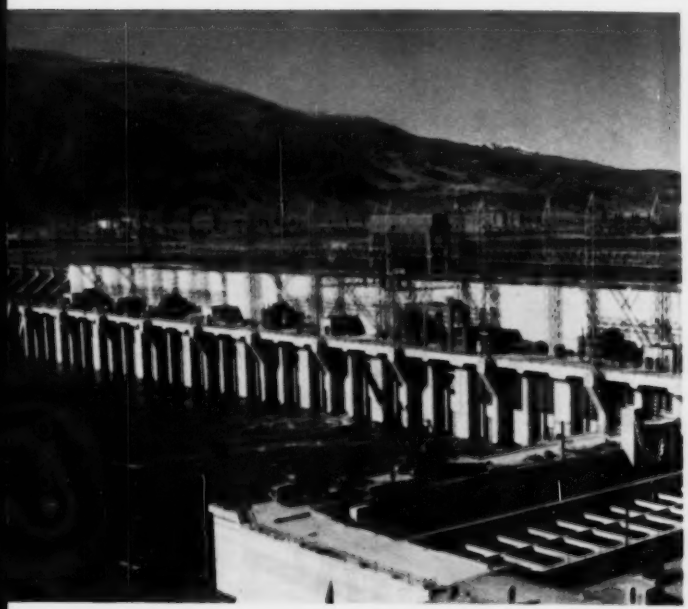
ELECTRICAL WEST

MAY 1961

A McGRAW-HILL PUBLICATION



PRIEST RAPIDS

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PARTNERSHIP THAT WORKED: The PUDs of Douglas, Grant and Chelan Counties in Washington become the catalyst that brings 3,000,000 kw of Columbia River power to the Northwest. How they tread a fine line between public and private power. For the story of this partnership, turn to the feature section.

50 CENTS

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LINES UP!

an eighteen minute sound-color film produced by the Reliable Electric Company to demonstrate deadending and splicing by the newest mechanical methods with particular attention to live-line work.

Interesting scenes include field installation procedures; heavy short circuit tests, tensile and vibration tests and a few manufacturing details.

Your Reliable representative or distributor will be happy to arrange a showing on your premises at any time.

Reliable

ELECTRIC COMPANY

Franklin Park, Illinois

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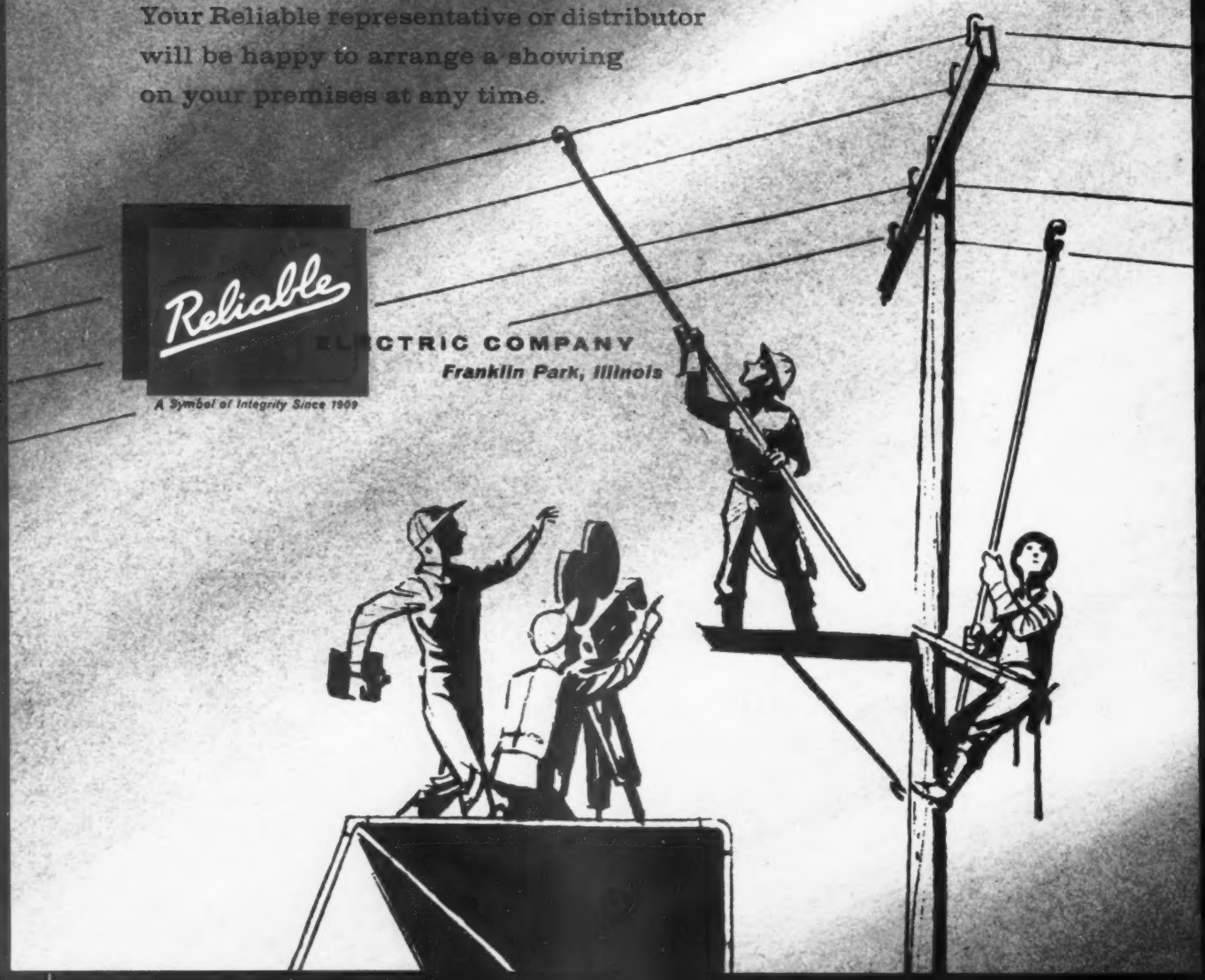


Magic Words: Job Security

Things that are bad for business are bad for the people who work for business

THOMAS E. DEWEY. SPEECH. SEPTEMBER 1944

Did you ever think that the people who have the most "security" in this country are the small select group in the penitentiary who are serving out life terms. They have no worries concerning the basic wants and needs of the average man, for food, clothing and shelter are provided by the government. On the other hand, they don't have any freedom either.

At the other end of the scale is the hobo who has chosen to obtain his basic economic wants where he can find them and at minimum effort. These may be minimum in quality but he has almost unlimited freedom to do as he pleases. Between these two extremes, the lifer and the hobo, the rest of us make our living. The moral is that complete security can be gained only by giving up complete freedom. This is true whether it is in the penitentiary or in the state dictatorship that now has nearly half the world's population in bondage.

Here in America, under the individual enterprise system, we seem to have managed to achieve a happy medium. We manage to keep about 68 million people employed in well-paid jobs. We manage to produce ever increasing quantities of new and interesting gadgets to make life easier and more enjoyable. In fact more people are worried about overweight than they are undernourishment. Statistics can be cited by the yard to show how well off the American worker is in terms of both necessity and luxury. Why, then, all this talk about job security?

In our last discussion, we talked about the importance of the job as a means of filling the economic wants of the individual. Because all of us are far removed from being self-sufficient, there lurks in the background of our mind the specter of losing our job and, hence, our daily bread. Of course, anyone can lose his job for incompetence or indolence. That's an individual problem. The more frightening prospect is to have the job disappear because the company is forced out of business for one of the many reasons that cause corporate failure. Even this is not disastrous if there are plenty of other jobs available in other lines of business or endeavor.

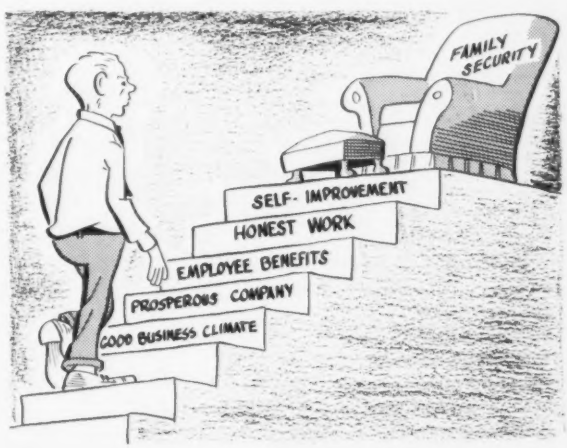
You can't legislate job security because a job is no good in a company that can't meet its pay roll. You can't legislate unemployment compensation if there are not enough companies to contribute to the unemployment fund. You can't make jobs in government work projects if the government cannot collect the taxes from individuals and corporations. Of course the government can print ersatz dollars, but these soon become valueless too. The alternative to all this would be to have the government take over the whole economic machine as it has done in Russia and China and Hungary and Cuba and other places in the world. We've heard about what happens to personal freedom there.

No, under our present system, true job security can be had only if a business climate is created under which corporations and companies can grow and flourish and the whole economy expands across the new frontiers that science has created. Thus new job opportunities are created for us and new jobs developed for our children who are growing up and will need jobs, too. And this growth and expansion can come about only if the incentive for personal and group improvement is retained so that people will be willing to risk their savings in new ventures.

It's a rather well-proved fact that no one has yet figured out a way to legislate a formula for a healthy business climate, but it's mighty easy to legislate business out of existence even with the best intentioned laws.

Some people say that the workers and management have different viewpoints. Even though this might be true if only the internal operations of a business are concerned, the general welfare of the organization is the concern of everyone who is a part of it.

The only way to get true job security and opportunity is to be a part of a company that is growing and thriving in a community that is consciously trying to promote a good business climate. You can help by taking an active interest in local political affairs. You can ask your supervisors and executives to explain some of the problems that hamper free wheeling in your company. You can keep an open mind and speak up against unjust criticism of your company and its people. After all, you and all your fellow workers from top to bottom are the company. That kind of puts your job security right back in your own hands.



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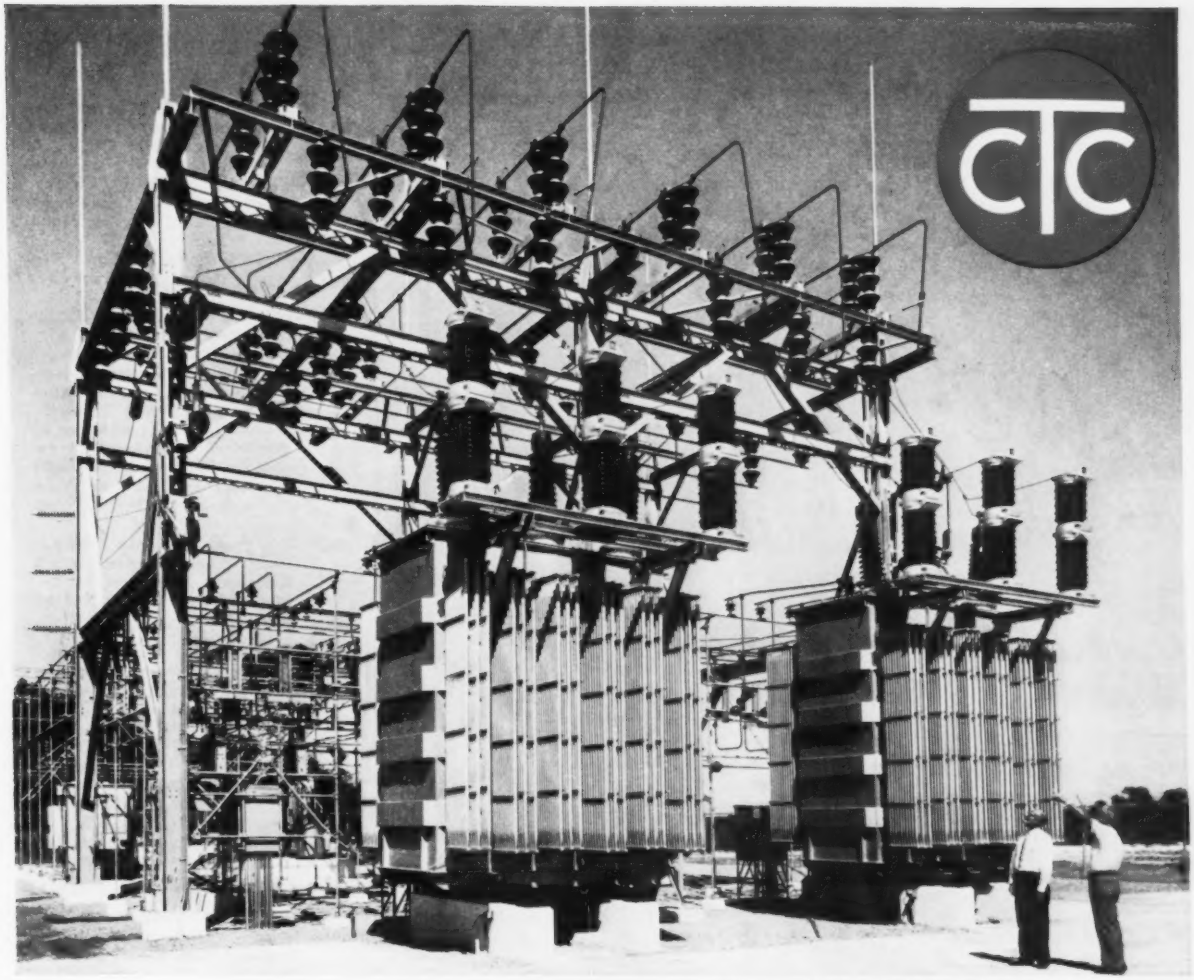

William H. Rutledge, district supervisor, and R. L. Johnsen, administrative assistant, of Florida Power & Light Company inspect new South Daytona Beach substation installation.

CENTRAL POWER TRANSFORMERS

IN SERVICE AT FLORIDA POWER & LIGHT COMPANY'S SOUTH DAYTONA BEACH SUB-STATION

Fast-growing Florida's need for more electric power is being served by substations such as the one shown above, located near South Daytona Beach. We are proud that two Central 7500 Kva transformers were chosen for this installation. The rating of these Central power transformers is 115,000 volts delta primary to 13800Y/7980 secondary.

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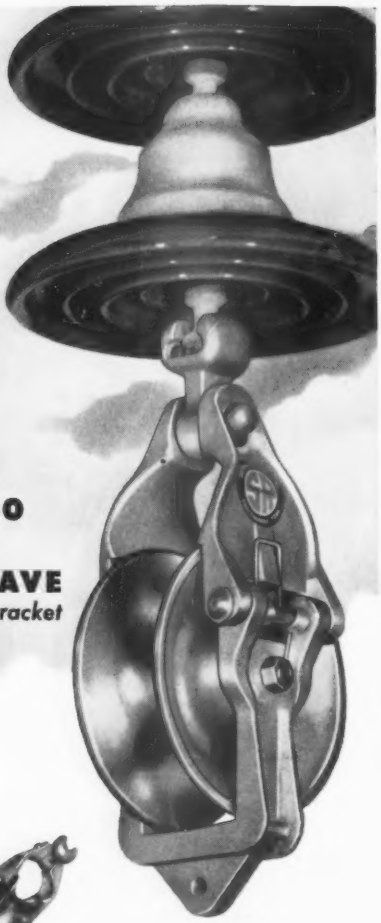
PINE BLUFF, ARKANSAS

Plants at Pine Bluff, Arkansas, and Arcadia, Florida

NEMA

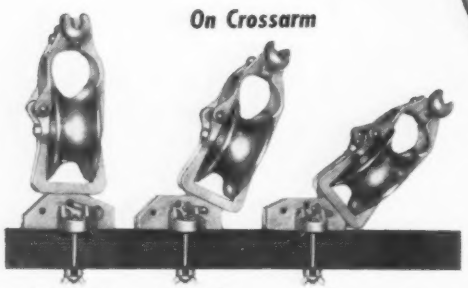
For phone number of closest representative see advertising index in back of book.

"linemen's dream" ...from any angle!

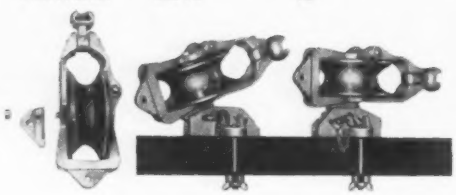


S&R MODEL XS-100 UNIVERSAL STRINGING SHEAVE
with adjustable crossarm bracket

On Crossarm



VERTICAL 22½° 45°



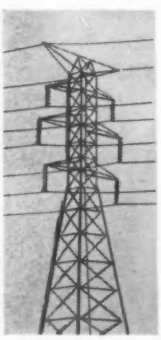
67½° 90°

On Crossarm With Added Angle Attachment

In Suspension

With Pole Bracket

67½°-90° Angle Attachment and Pole Bracket are accessories.



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Please send complete catalog of S&R conductor stringing equipment.

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Meetings Calendar

MAY

1-2—*Illuminating Engineering Society*, Intermountain Region Conference, Hotel Utah, Salt Lake City.
2-4—*AIEE, IRE, WEMA, EIA* sponsored Electronic Components Conference, Jack Tar Hotel, San Francisco.
3-5—*IES*, South Pacific Coast Region conference, Sacramento Inn, Sacramento.
8-9—*IES*, Pacific Northwest Region conference, Harrison Hot Springs, Harrison, B. C.
17-19—*Pacific Coast Electrical Assn.*, annual conference, Sheraton-Palace Hotel, San Francisco.
20—*International Association of Electrical Inspectors*, three-chapter joint meeting; Northern and Central California, Sacramento Valley, Fresno, Calif.
24-26—*Northwest Electric Light & Power Assn.*, Accounting & Business Practice Section, Medford Country Club, Medford, Ore.

JUNE

1-3—*Tri-State Electric Cooperative*, Oregon, Washington and Idaho, annual meeting, Shore Lodge, McCall, Idaho.
1-11—*Construction Industry Exposition & Home Show*, 16th annual home show, Los Angeles Memorial Sports Arena, Los Angeles.
8-9—*National Electrical Manufacturers Assn.*, Western conference, Biltmore Hotel, Los Angeles.
11-14—*Electrical Apparatus Service Assn. (NISA)*, national convention, Jack Tar Hotel, San Francisco.
15-16—*Northwest Public Power Assn.*, Engineering and Operations Section annual meeting, Marion Hotel, Salem, Ore.
26-28—*Canadian Electrical Assn.*, annual meeting, Banff Springs Hotel, Banff, Alta.

JULY

4-7—*National Society of Professional Engineers*, 27th annual meeting, Olympic Hotel, Seattle.
9-14—*Los Angeles Summer Market*, Home Furnishings Mart, Los Angeles.
17-21—*San Francisco Summer Market*, Western Merchandise Mart, San Francisco.
18-20—*Western Plant Maintenance Show*, Pan Pacific Auditorium, Los Angeles.

AUGUST

22-25—*Western Electronic Show & Convention*, Cow Palace, San Francisco.
22-25—*American Institute of Electrical Engineers*, Pacific general meeting, Hotel Utah, Salt Lake City.

SEPTEMBER

6-8—*Northwest Public Power Assn.*, Power Use Section, annual meeting, Pacific University Campus, Forest Grove, Ore.

KNOW YOUR SYMBOLS

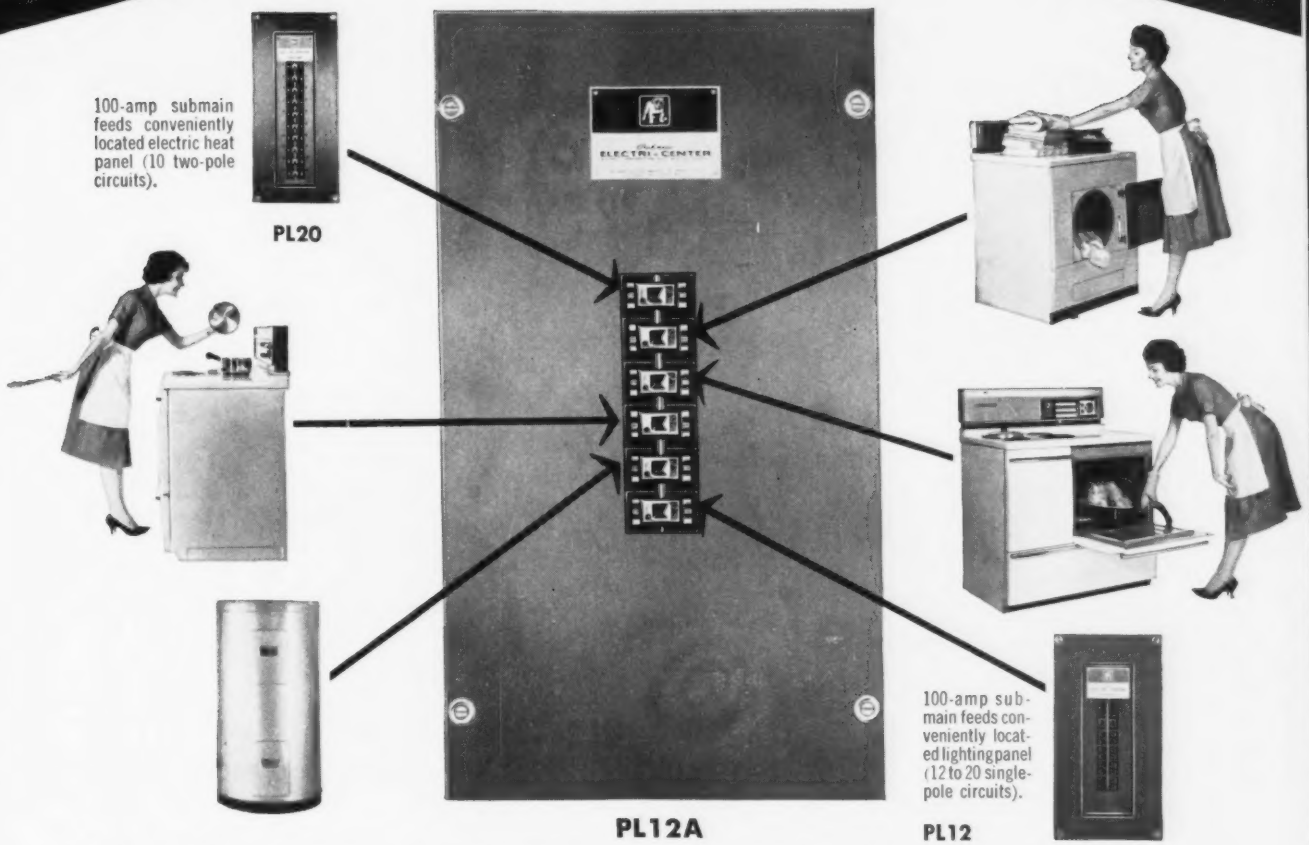
This symbol stands for circuit breaker

This symbol stands for QUALITY

BULLDOG'S 200-AMP SERVICE DISTRIBUTION PANEL—

"Power-packed" for all-electric homes!

Here's Electri-Center circuit flexibility aplenty for heating, lighting, appliances...


100-amp submain feeds conveniently located electric heat panel (10 two-pole circuits).
PL20
ELECTRI-CENTER
PL12A
100-amp submain feeds conveniently located lighting panel (12 to 20 single-pole circuits).
PL12

Originated by BullDog expressly for service distribution in all-electric homes, the Pushmatic® 200-amp PL12A Electri-Center® provides any combination of circuits up to 24 poles . . . and allows location of subpanels for customer convenience—and *wiring convenience!* Other 100- and 200-amp Electri-Center panels provide a wide choice that meets all other residential requirements.

Pushmatic circuit breakers protect two ways! In Pushmatic breakers from 15 to 50 amps, a built-in time-delay prevents nuisance tripping from harmless, normal current inrush, but assures positive protection against dangerous overloads. In every Pushmatic, a magnetic coil trips immediately, *without* delay, if a short circuit occurs. By combining these two safety systems, Pushmatic breakers assure dependable protection under all residential load conditions.

For details write for your "Pushmatic Pocket Guide"—it's free!

AMERICAN BUILDER SEAL OF QUALITY

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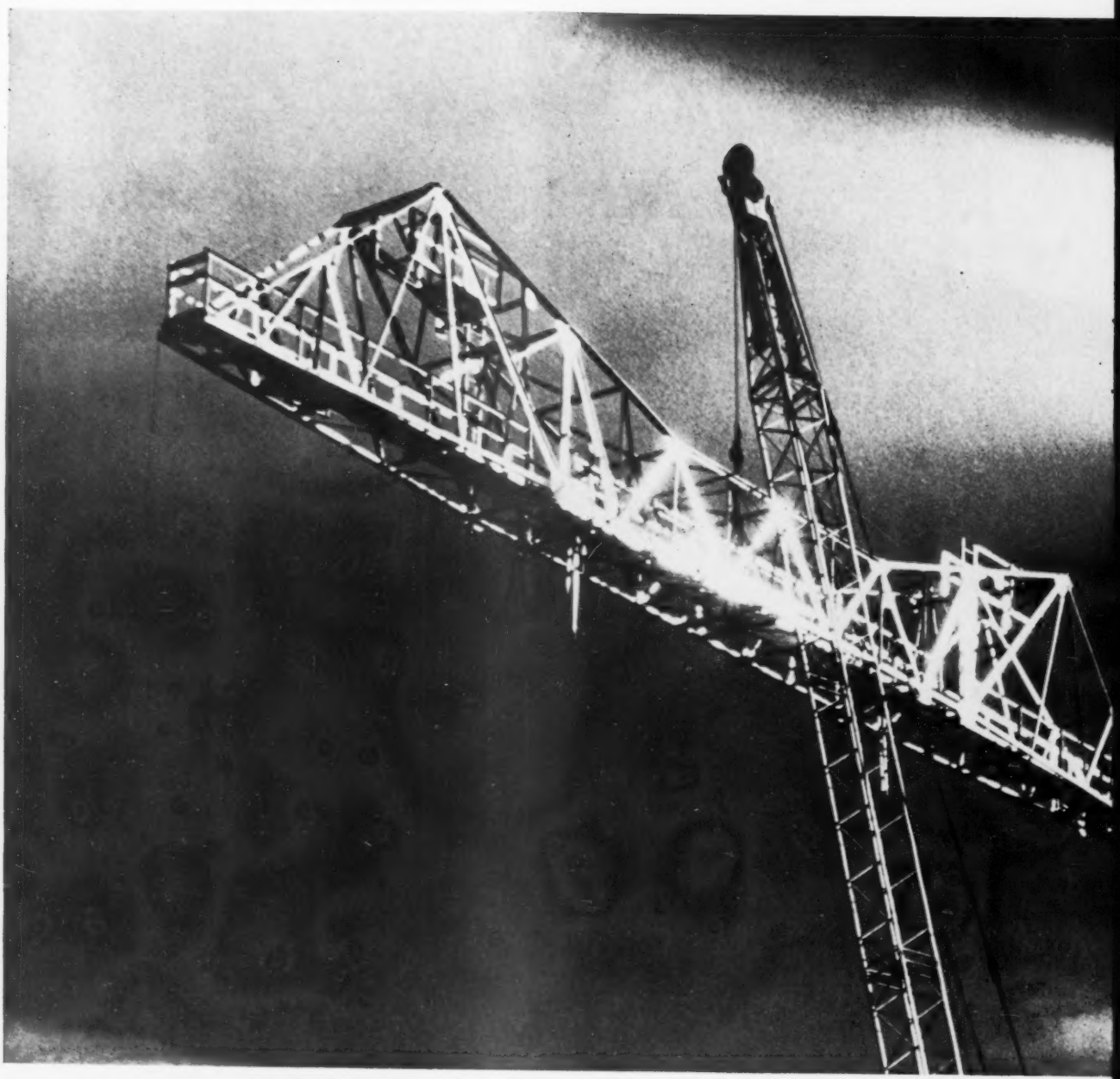

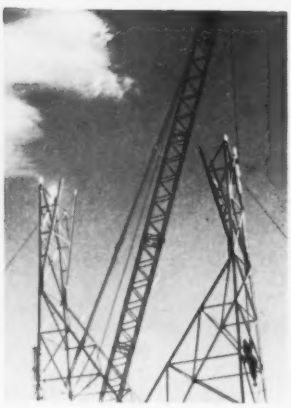

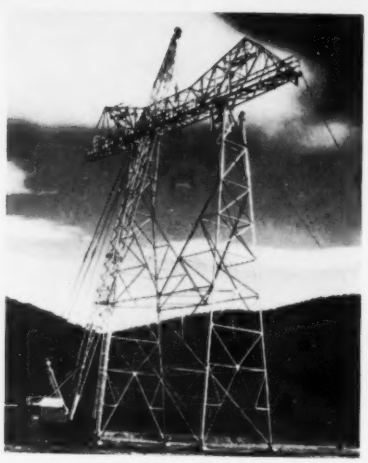

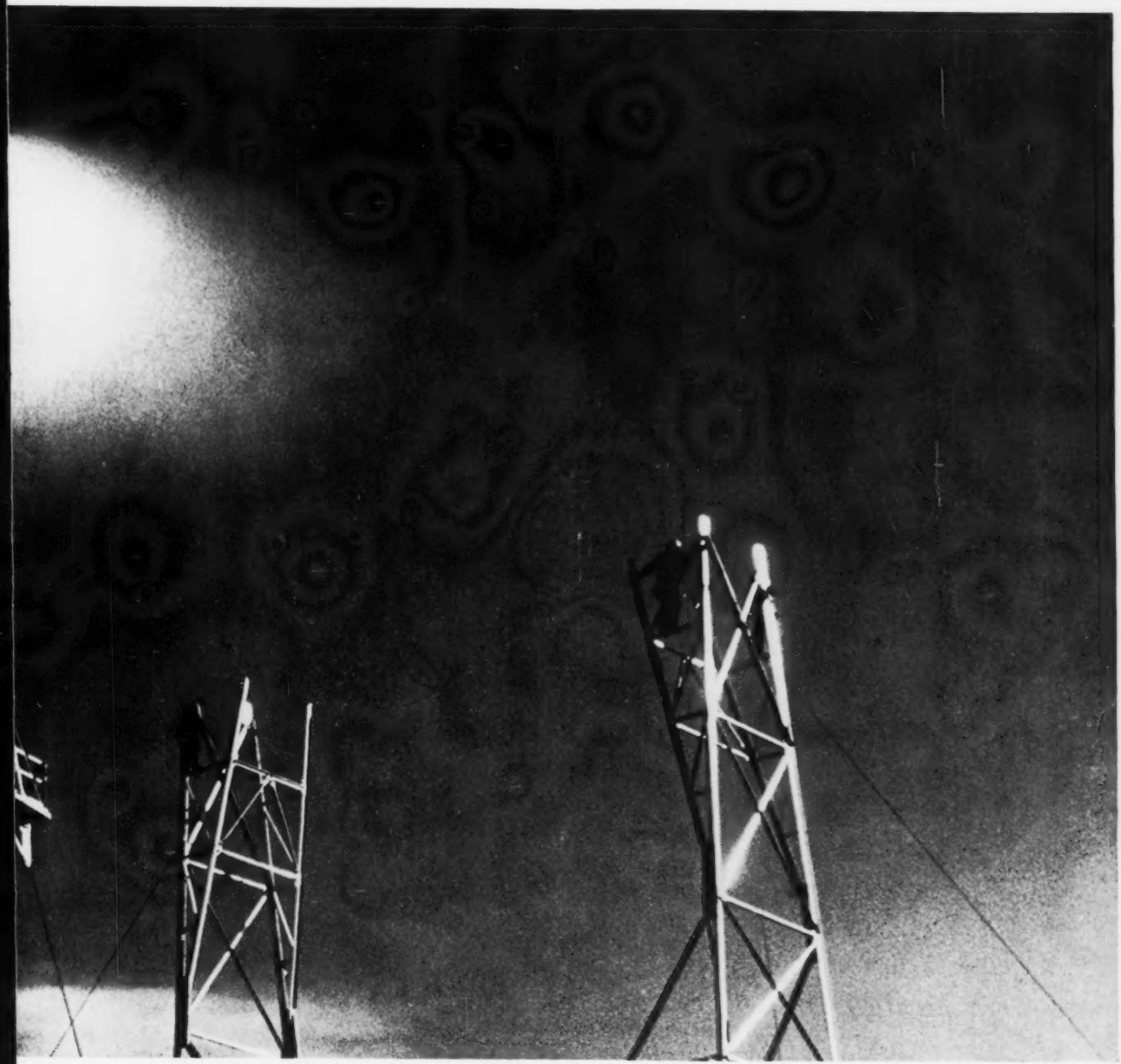

Alcoa Structural Division designs and fabricates aluminum towers that can be erected fast—often in a matter of hours. Lightweight aluminum towers (and substation structures) can be manufactured economically and require no maintenance.

Write: Aluminum Company of America, Structural Division, 873-E Alcoa Building, Pittsburgh 19, Pa.

ALCOA ALUMINUM
STRUCTURAL DIVISION

For phone number of closest representative see advertising index in back of book.

A development of Orangeburg and Flintkote Research, new *klean-kote* Orangeburg Brand Fibre Conduit has a tough non-brittle protective coating for cleaner, safer handling. Ask your wholesaler to show you a length. klean-kote* **ORANGEBURG® BRAND *Fibre Conduit***

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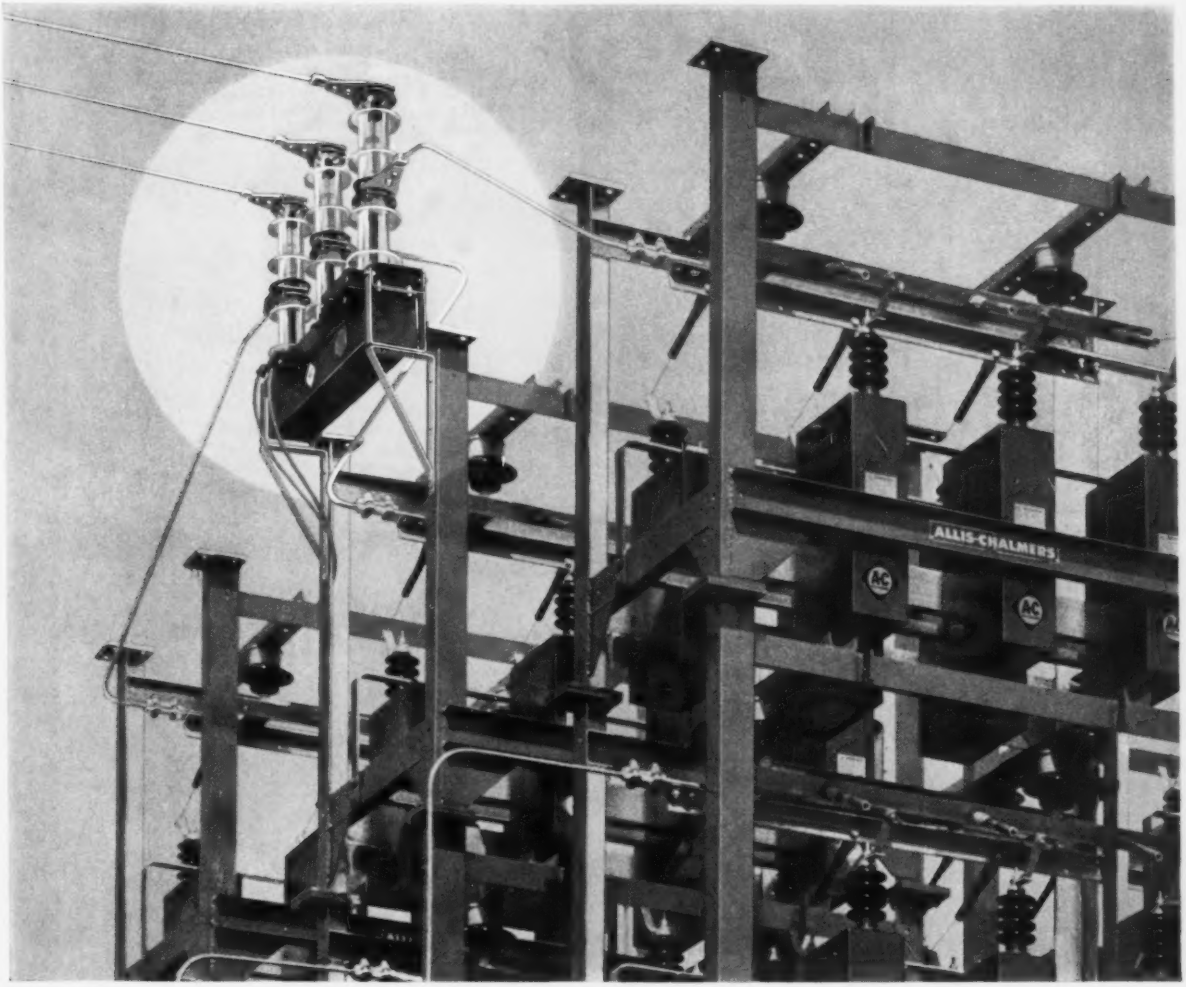


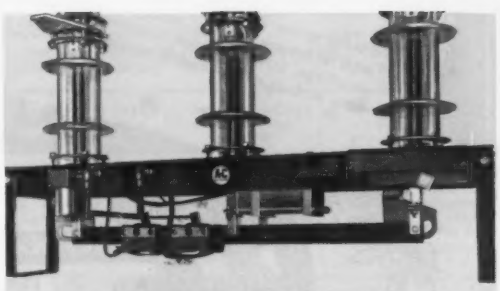
Now...a low-cost vacuum capacitor switch

Restrike-free... lightweight... reliable

Competitive with conventional oil switches... this new 14.4-kv, 300-amp Allis-Chalmers three-phase vacuum switch is specifically engineered for capacitor duty. It operates from ac or dc, manually or by fully automatic control as the system demands. You get restrike-free performance, reliability and maintenance-free operation. Weight is one-third that of oil-type switches.

Resistance to physical damage is just as spectacular. Point-blank, 22-long rifle fire failed to penetrate the tough Plexiglas protective housing. The vacuum tubes withstood pressure tests in excess of 20 times normal closing forces.

For more information, contact your nearby A-C office. Or write **Allis-Chalmers,** *Power Equipment Division, Milwaukee 1, Wisconsin.* A-1409



How it works — Front view shows capacitor switch mechanism housing with cover removed. When coil is energized, solenoid plunger moves connecting rod through cam to close the contacts.

For phone number of closest representative see advertising index in back of book.

in the long run... it's O.Z.

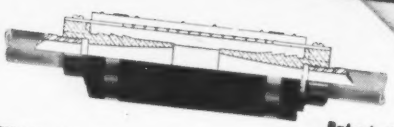
Type AX

Provides 4" expansion, contraction movement. Malleable iron head, body Hot Dip Galvanized. Weatherproof head sealed by factory-installed high grade graphite packing. Insulating conduit end bushing eliminates cable abrasion. 10 sizes for conduit ½" to 4" diameters.

Type EX

Permits 8" conduit movement. Optional length sleeves, additional cost. Weatherproof head sealed by factory-installed high grade graphite packing. Insulating bushings prevent cable abrasion. Hot Dip Galvanized finish. 12 sizes for ½" to 6" conduit diameters.

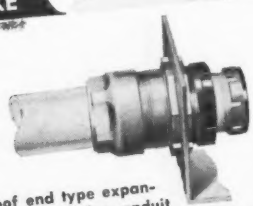
Type DX



Patented

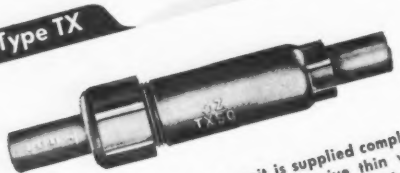
Compensates for deflection, expansion, contraction. ¾" movement all directions from normal; 30° angular movement. Also used as vibration damper between conduit sections. 10 sizes. Watertight (NEMA 4) and submersible under 25 ft. head of water.

Type EXE



Weatherproof end type expansion fitting. Designed for conduit terminating in junction box, where expansion, contraction take place. Supplied complete: locknuts, bushings. Standard finish, Hot Dip Galvanized. 12 sizes.

Type TX



Similar to the Type AX, this unit is supplied complete with extension nipples, ready to receive thin wall couplings. Standard finish is cadmium plated. Available in 6 sizes for conduit ranging from ½" to 2".

for the longer line of EXPANSION FITTINGS

In the long run, no line of conduit is more dependable than its components. When it comes to dependability in expansion fittings, look to O. Z. as the line that measures up! Five basic types provide the dependable answer to your fitting problems in conduit expansion, contraction, and deflection. O. Z. is the dependable line because it's the line with the *right size*, the *right type*, for every requirement! Types AX, DX, EX and EXE available in aluminum at no extra cost.

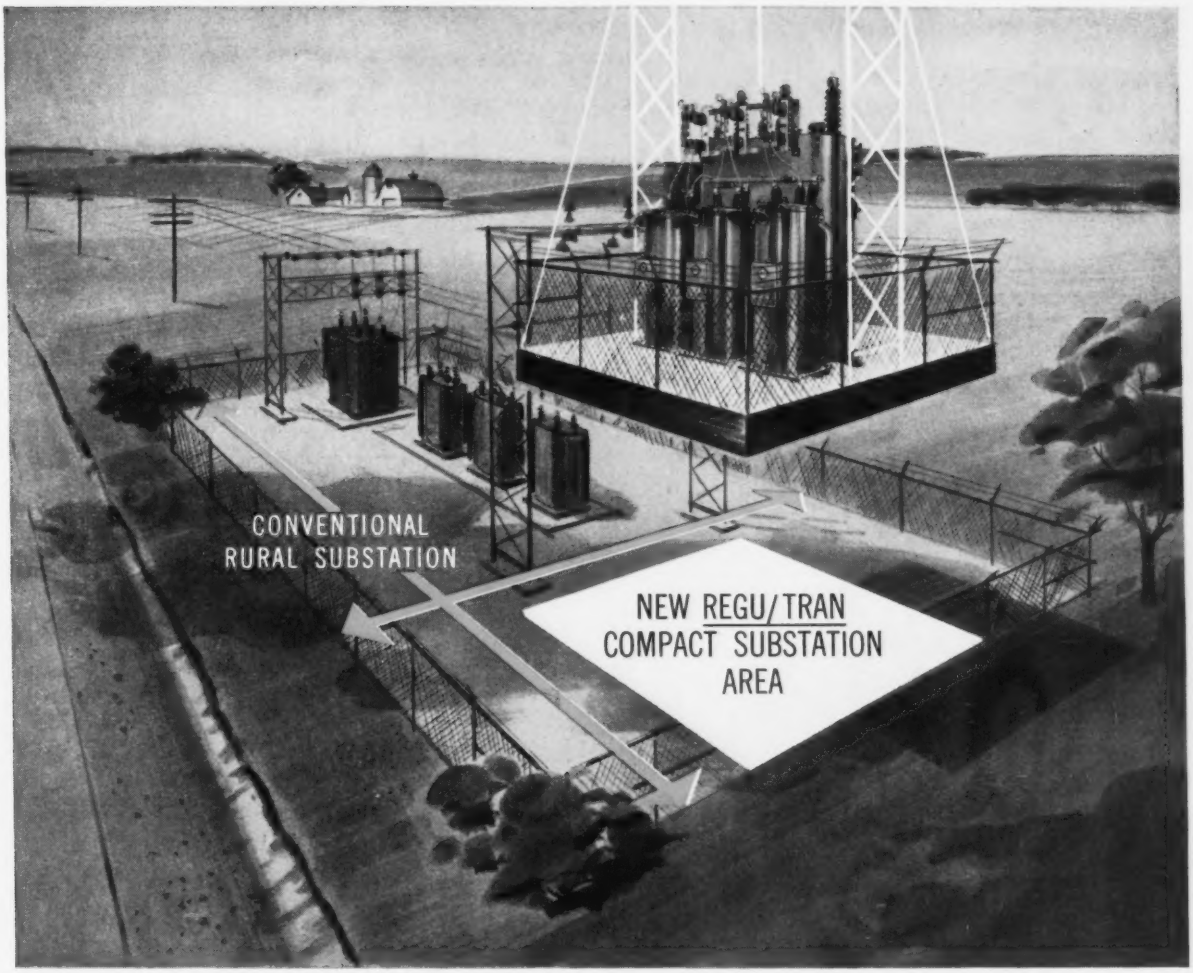
O.Z. ELECTRICAL MANUFACTURING CO., INC.

262 BOND STREET • BROOKLYN 17, N. Y.

- CAST IRON BOXES
- CABLE TERMINATORS
- POWER CONNECTORS
- SOLDERLESS CONNECTORS
- GROUNDING DEVICES
- CONDUIT FITTINGS
- INTERLOCKED ARMOR CABLE FITTINGS

Sales Office and Warehouse: 406 So. Cicero Avenue, Chicago 44, Ill. • ESterbrook 9-0326
Office and Factory: 749 Bryant Street, San Francisco 7, Calif. • GArfield 1-7846

ALLIS-CHALMERS



Space – just one of many savings!

A complete, compact substation package from Allis-Chalmers!

You get guaranteed performance and the economy of a standardized item. *Regu/Tran* compact substation requires only 25% of the area needed by conventional rural substations.

More savings! Buy the entire package on just one purchase order. Shipments are dovetailed to your construction schedule. All parts are keyed to master drawings.

Designed for future load growth! All structural members are punched for adding H.V. and L.V. bays later.

Heart of the substation is the *Regu/Tran* unit. This new concept provides single-phase regulation with provision for safe by-passing of regulating equipment without dropping the load. A-1442

Regu/Tran is an Allis-Chalmers trademark.

Regu/Tran compact substation vs conventional

1. Just 1 mounting pad instead of 3	**2.** 4 piers instead of 6	**3.** 13'9" x 22' compared to 24'x62'
4. Requires just 25% of the real estate formerly needed	**5.** Cuts fencing needs in half	**6.** Requires considerably less grounding material
7. Less interior gravel or rock surfacing	**8.** Preassembled main structures cut erection time	**9.** Regu/Tran unit can be replaced with larger unit later without changing structure

Ask your nearby A-C office for Bulletin 61B9756 or write **Allis-Chalmers,** *Power Equipment Division, Milwaukee 1, Wisconsin.*

For phone number of closest representative see advertising index in back of book.

Over 29,000 ft. of SPANG Conduit was installed in the Fireman's Fund Insurance Building, Atlanta. Electrical Contractor T. H. Fulton reports easy working qualities of SPANG Conduit helped keep project far ahead of schedule.

Architects: Saggus, Williamson, Vaught & Spiker, Atlanta
General Contractor: Barge & Company, Atlanta
Electrical and Mechanical Engineers: Newcomb & Boyd, Atlanta
Mechanical Contractor: Sockwell & Company, Atlanta
Electrical Contractor: Fulton Brothers Electrical Co., Atlanta
SPANG Distributor: Graybar Electric, Atlanta

SPANG® CONDUIT

Electric heating wiring protected by SPANG conduit in new Atlanta building

The new Fireman's Fund Insurance Building will be one of the first Atlanta buildings to be heated electrically next winter. And SPANG Conduit was chosen to protect the wiring in this installation.

The 460-volt electric system in this all-electric, three-story 66,000 sq. ft. building calls for 1600 amps with provision for 3000 amps. It serves three central air conditioning units, lighting and power as well as the electric heating. Over 29,000 ft. of SPANG HD Galvanized Conduit and SPANGLEAM EMT were installed by Fulton Brothers Electrical Company, Atlanta, to provide top-quality wiring protection.

Mr. T. H. Fulton, president of Fulton Brothers, says, "We take pride in how our finished work looks, and SPANG Conduit presents an excellent appearance in exposed locations. The conduit was easy to bend and thread, helping us stay far ahead of schedule.

"SPANG is one of the most satisfactory conduits we have ever used. This fact, plus the wonderful service and delivery we get, makes SPANG a product we use wherever possible."

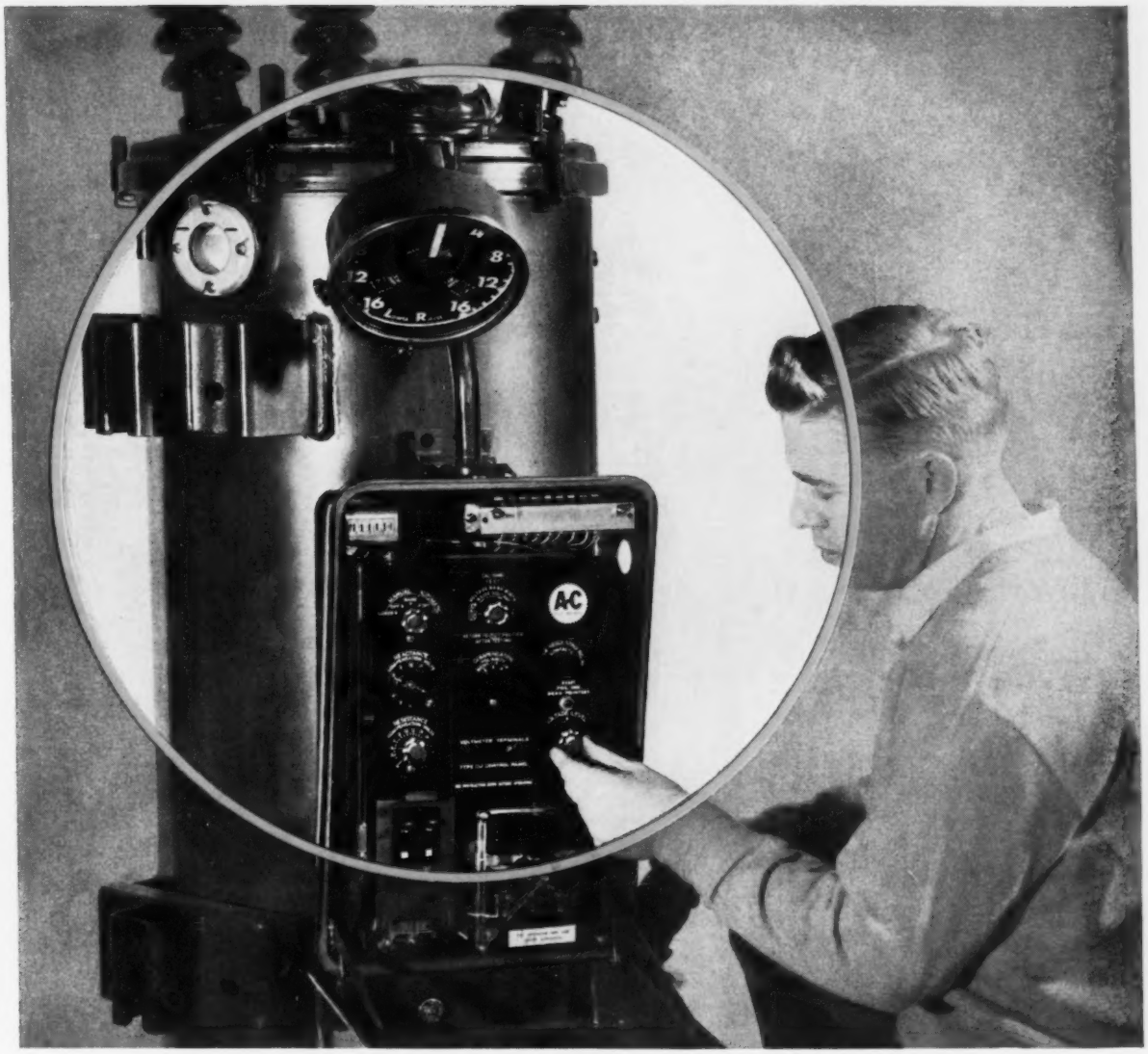
You can assure yourself of top-quality, trouble free conduit installations with SPANG Conduit. Try it and see! Let your nearby SPANG Distributor serve you. He carries the complete line of top-quality SPANG Conduit and Fittings.

SPANG Conduit is one of the many fine products produced by *National Supply Division, Armco Steel Corporation, Two Gateway Center, Pittsburgh 22, Pennsylvania.*

ARMCO National Supply Division

ALLIS-CHALMERS

Originators of 5/8% Step Regulators



"Magic Circle" control center

Puts all JFR regulator indicators, controls at operator's fingertips!

Completely electrical adjustment with famous *Feather-Touch* control accurately sets narrow band widths and voltage levels.

Fingertip-adjustable *Caliband* control cuts setting time without changing customer voltage or compensator settings.

Electrically resettable position indicator drag hands eliminate pole climbing or "climber" damage!

Conveniently located oil sight gauge permits checking oil level at a glance.

Six-digit counter records up to one million operations, simplifies record keeping and detects excessive operations.

Snap-action *Vari-Amp* control for positive settings.

Specify **Allis-Chalmers** *Regulators . . . call, wire or write your nearby A-C office.* A-1444

Feather-Touch, Vari-Amp and Caliband are Allis-Chalmers trademarks.

For phone number of closest representative see advertising index in back of book.

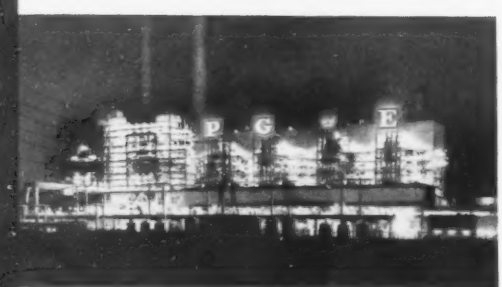
FISHER-PIERCE MODEL 6600A installation on an access road to the Nimitz Freeway in Oakland

Irrepressible Californians are Never Satisfied with the Status Quo

Right now they're dredging a channel to make a seaport out of Sacramento, some 40 miles from salt water. Already, landlocked Stockton has been made into a thriving ocean port. This kind of forward-looking attitude seems to be characteristic of California, homeland of Pacific Gas & Electric Company.

Progressive thinking is also typical of mammoth PG&E, serving 6.7 million people in Northern and Central California. Here's some evidence: a 1400-mile pipeline project to tap Canadian natural gas resources; the only American generating station using steam from natural geysers; construction of the largest steam-electric plant in the Western U. S.

The same kind of progressive thinking prompted PG&E's decision to use individual photoelectric controls on street lights in all new construction areas. Multiple individual control permits supply from secondary lines, greatly reducing initial costs. Further, with no high voltage series street lighting wire, pole work is simplified and made much safer. Another dividend of uncluttered poles — better appearance — is also important to those irrepressible Californians.



LARGEST STEAM-ELECTRIC POWER PLANT in the West is the Pittsburg Power Plant in the San Francisco Bay area. Two 330,000-kilowatt generating units being added on the left will increase capacity to 1,320,000 kw in 1961, raising PG&E system capacity to nearly six million kw.

For phone number of closest representative see advertising index in back of book.

FISHER-PIERCE 6600A INSTALLATIONS IN PG&E TERRITORY

Why Fisher-Pierce 6600A Controls?

In addition to providing the general advantages of multiple individual control, utility experience all over the country has shown that Fisher-Pierce controls are *built to last*. They dependably and automatically turn lights on at dusk, off at dawn, regardless of weather or season—year after year. You avoid the high cost of repeatedly sending men to replace less dependable, "throw-away" controls.

Labor costs are also lowered by the short time delay in Fisher-Pierce controls. To check a new installation, the lineman simply covers the window for a few seconds. Yet this short time delay has proved completely effective in preventing false turn-off from lightning flashes.

. . . controlling parking lot lighting in the Piedmont Hills

. . . controlling street lighting in residential East Oakland

. . . controlling parking lot lighting at the University of California Memorial Stadium

For complete design information and operating specifications on Series 6600A controls, write Fisher-Pierce Division, Sigma Instruments, Inc., 43 Pearl Street, So. Braintree 85, Mass.

FP

FISHER PIERCE

Electrical and Electronic Equipment for Industry, Utilities and the Home

simplify installation . . . reduce inventory

with BLACKBURN PARALLEL GROOVE CLAMPS

TWO sizes make up to 90% of the tap connections required on most distribution systems.

Tools normally carried by linemen are all you need to install Blackburn parallel groove clamps easily and properly. The problem of finding the right die inserts for specific connections is eliminated . . . the chance of human error is lessened.

Inventories can be reduced drastically. Only TWO clamp sizes take wire sizes from 8 solid to 336.4 ACSR, with taps from 8 solid to 1/0 ACSR.

Use these clamps on **aluminum** . . . also on **aluminum to copper** when prefilled with Contax, an oxide-inhibiting paste non-injurious to natural rubber. This also simplifies stocking, reduces the types of clamps needed in warehouses and on line trucks.

For the few installations outside 8 solid—336.4 ACSR main and 8 solid—1/0 ACSR tap range, other sizes are available.

Blackburn parallel groove clamps are engineered for high resistance to weathering, galvanic corrosion, vibration and other enemies of good connections. Construction is of high-strength aluminum alloy, with rocker and spring action to counteract differences in coefficient of expansion when used for bi-metallic connections.

For complete information and test data, send for Bulletin #6007. Samples on request.

Jasper

BLACKBURN

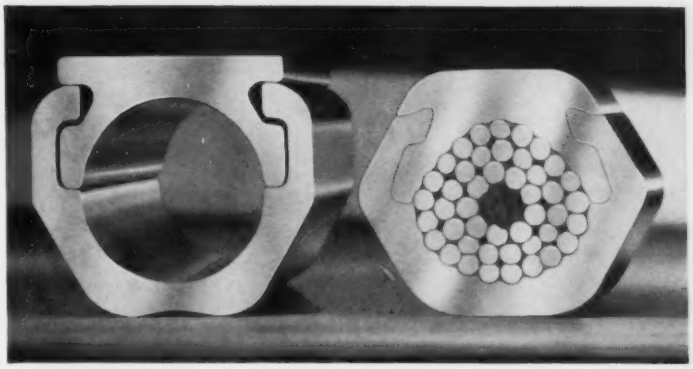
Corporation

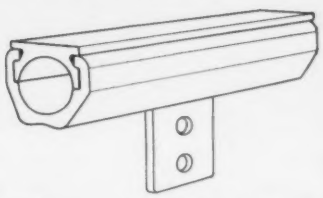
1525 Woodson Road • Saint Louis 14, Missouri

New two-piece sleeve

What's new about this two-piece compression section? It's *interlocked*. Extruded sections, compressed with hexagonal dies, interlock like hooked fingers (or like a railroad car coupling).

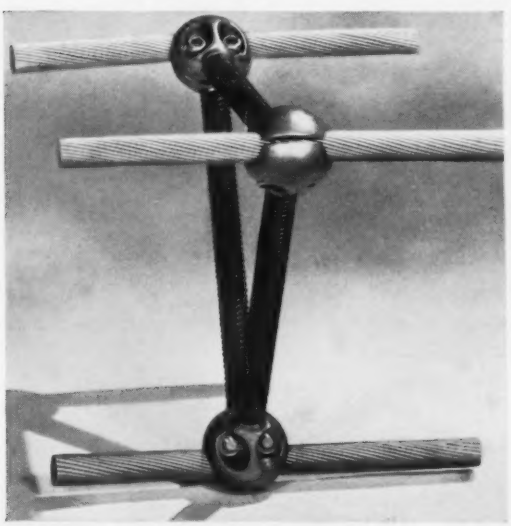
The cross-section photo shows the result of this interlocking action—the establishment of an unbroken "closed loop of stress" eliminates relaxation. The convenience of a two-piece section is combined with the reliability of a one-piece compression sleeve.





Used as a repair sleeve, the new design will do an excellent job of restoring the strength and conductivity of damaged or broken strands. Tests show this full strength was restored even after cutting *all* the aluminum strands in 795 MCM 26/7 ACSR. We don't recommend such drastic usage, even though tests demonstrate the great effectiveness of interlocked "closed stress loop."

This two-piece design is available in tee taps, tee connectors, and repair sleeves—part of Alcoa's *complete* line of tubular accessories for all sizes of aluminum and ACSR conductors. All parts are wrought aluminum. For more information, call in your Alcoa-Rome representative.



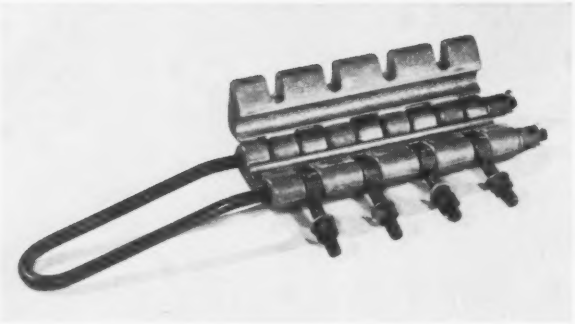
Spacers for bundled conductors

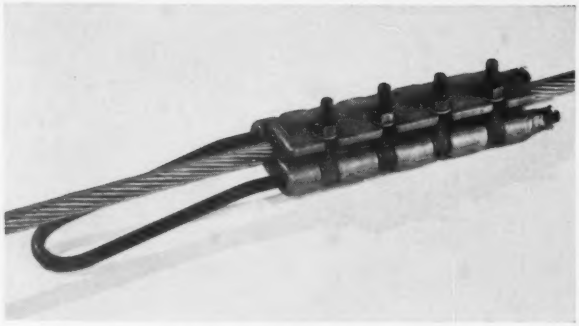
This is Alcoa's "tri-spacer" for transmission lines designed with three-conductor bundles. Its components are similar to the two-conductor spacers already used by a number of utilities on their transmission lines. The closed-spring type spacer is based on many years of extensive laboratory and field testing of various designs.

In the "tri-spacer" design, aluminum spherical clamps grip the individual conductors and are joined by helical springs. The spacer is flexible in all directions and provides excellent column strength and fatigue resistance. Its corona threshold is well above that of the bundled conductor.

"Tri-spacers" have been installed on a test line currently in operation. Our engineers will gladly consult with you on multi-conductor spacers for transmission line or substation use.

(continued on next page)





New comealongs handle higher tensions, bigger conductors

There are two very good reasons why Alcoa designed a new comealong. First was the need for a tool that could handle *safely* the higher stringing and sagging tensions that are commonly encountered in today's transmission-line construction. Second, and equally important, the increasing use of *large-diameter* conductors calls for a comealong that can handle these bigger sizes.

The new Alcoa® 3000 series comealongs are designed specifically to cope with both the bigger sizes and higher tensions. The 3000 series accommodates diameters to 2.381 inches compared with the maximum of 1.382 for the older 4000 series. It is designed to handle tensions 50% higher than the older series. The streamlined shape, aside from affording a pleasing appearance, results in a section that has a substantial safety factor even when bolts are tightened beyond recommended torque.

In designing and producing the 3000 series comealongs, Alcoa used careful stress analysis and many advanced casting techniques. Each comealong is inspected after assembly; proof-tested on conductors at higher-than-rated tensions; inspected again prior to shipment.

All the facts and figures are available through your Alcoa-Rome representative.

Unique tool eliminates need for expensive hot line clamps

With Alcoa's unique clamp gripper tool you can now use standard Alcoa parallel groove clamps for making "hot" line connections. The tool in effect performs the functions of the mechanism of a hot line clamp. The big advantage is that you can remove it from the line after installing the effective parallel groove electrical connector. You can use this new Alcoa tool with most common type "shotgun" hot line sticks. This tool is a really sound investment—inexpensive, electrically proved pg clamps replace expensive, troublesome hot line clamps. Contact your Alcoa-Rome representative for details. Or write to Rome Cable Division of Alcoa, Rome, New York.

New cellulose dip-coating protects terminal pads

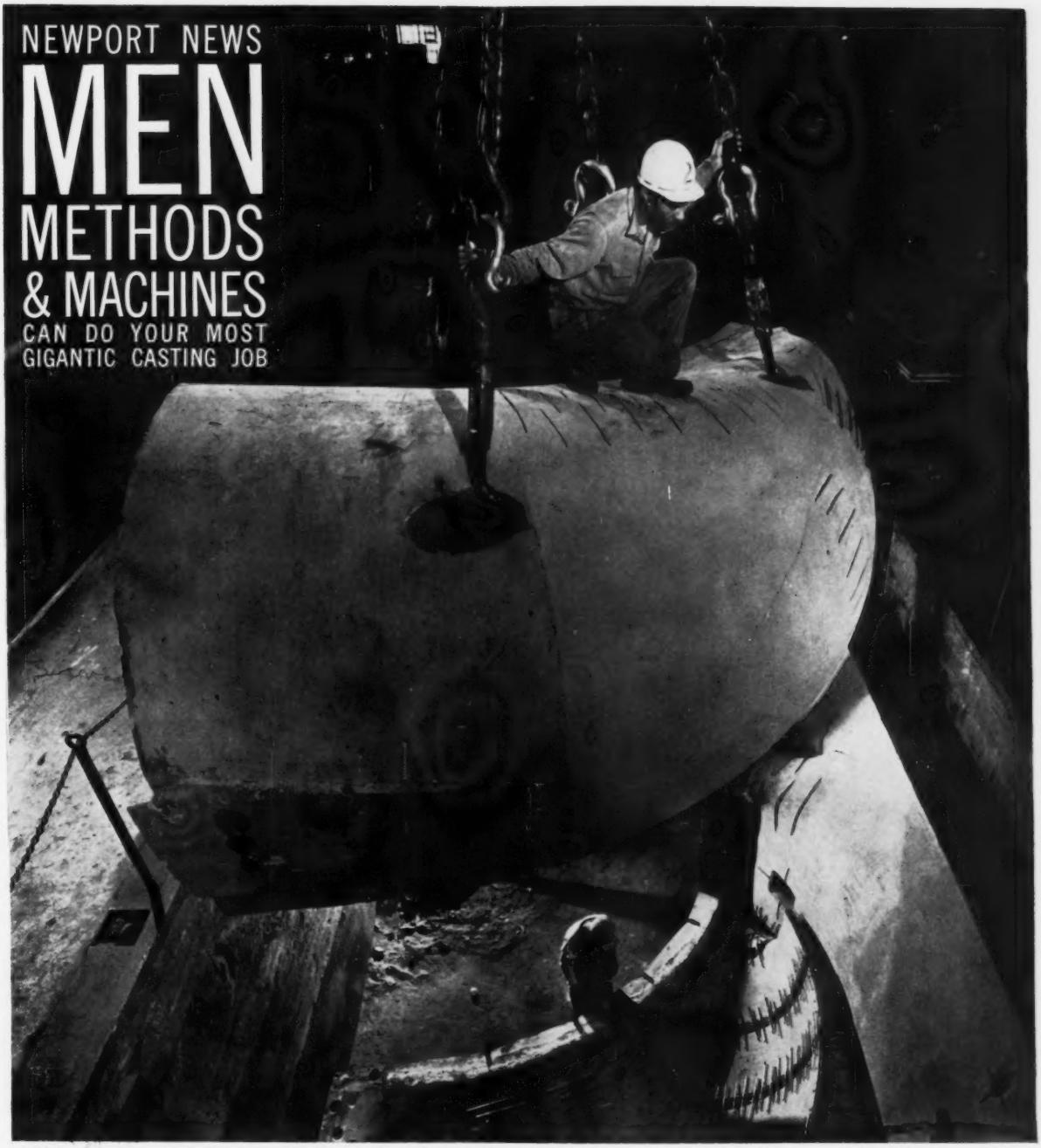
To insure a flat and clean electrical contact surface, the pads of all Alcoa terminals are carefully ground. However, these terminal pads may occasionally be damaged during shipment to the installation site. Along the way, they are subjected to handling that may result in pads being gouged, contaminated with foreign matter, or exposed to severe oxidizing environments.

But no more. Alcoa has solved that problem. To make sure that the terminal pads are in "mint" condition when it's time to install them, they are dipped in a *strippable* cellulose coating at the factory. This coating protects the pads against the hazards mentioned.

Just prior to installation, peel off the coating (it peels as easily as a banana), apply joint compound and bolt it tight.

Specify dip-coated next time you order Alcoa terminals. The first experience with the coating proves its value.

ALCOA
ROME CABLE
DIVISION



Mold for a section of a turbine stay ring for the Hartwell Power Plant. It is the largest one-piece Y-casting ever produced by Newport News.

It takes all three—men, methods and machines to tackle a job as big as this one! Newport News has completed many of them including six hydraulic turbines for the Niagara Project, four for the Hartwell Power Plant, and many others.

Newport News not only cast this giant unit but also milled it—and built the boring mill that did the work! No challenge is too great.

The secret of its leadership in the fabrication of heavy equipment is its staff of highly trained engineers and technicians, thousands of skilled workmen and 225 acre plant capable of turning out such projects as hydraulic turbines and valves, vacuum or pressure vessels for the petrochemical industry, bridge caissons, wind tunnels, and pulp and paper equipment.

Consult Newport News for preliminary recommendations at no obligation.

Newport News
SHIPBUILDING AND DRY DOCK CO.
NEWPORT NEWS, VIRGINIA

A patented,* electronic testing system subjects Moloney Distribution Transformers to all standard tests and automatically rejects any unit which does not meet Moloney's standards of performance.

Automatic testing was developed by Moloney Electric Company to eliminate the possibility of human error in transformer testing and to improve quality control. Users can be sure that Moloney Transformers have successfully passed all tests and are electronically approved for service.

This patented,* automatic test system is one of many Moloney developments leading the way to better products for transformation. Specify electronically proven Moloney Distribution Transformers.

ME61-8

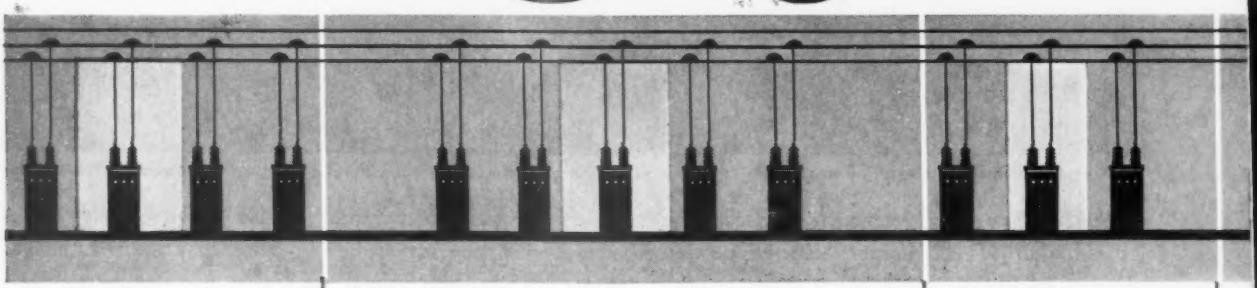
PATENTED* SYSTEM ELECTRONICALLY TESTS MOLONEY

MOLONEY ELECTRIC COMPANY

Since 1896 ... MORE POWER TO YOU

ST. Llouis 20, MO., AND TORONTO, ONT., CANADA

*U. S. PATENT NO. 2905891



RATIO TEST
Supplements complete ratio test given each core-and-coil unit before tanking, checks each transformer for correct voltage ratio and ratio adjuster position.

IMPULSE TEST
Proves each transformer capable of withstanding over-voltages resulting from lightning and switching surges by overstressing bushings, layer, turn and divisional insulation as well as insulation between high and low voltage windings, and between the windings and ground.

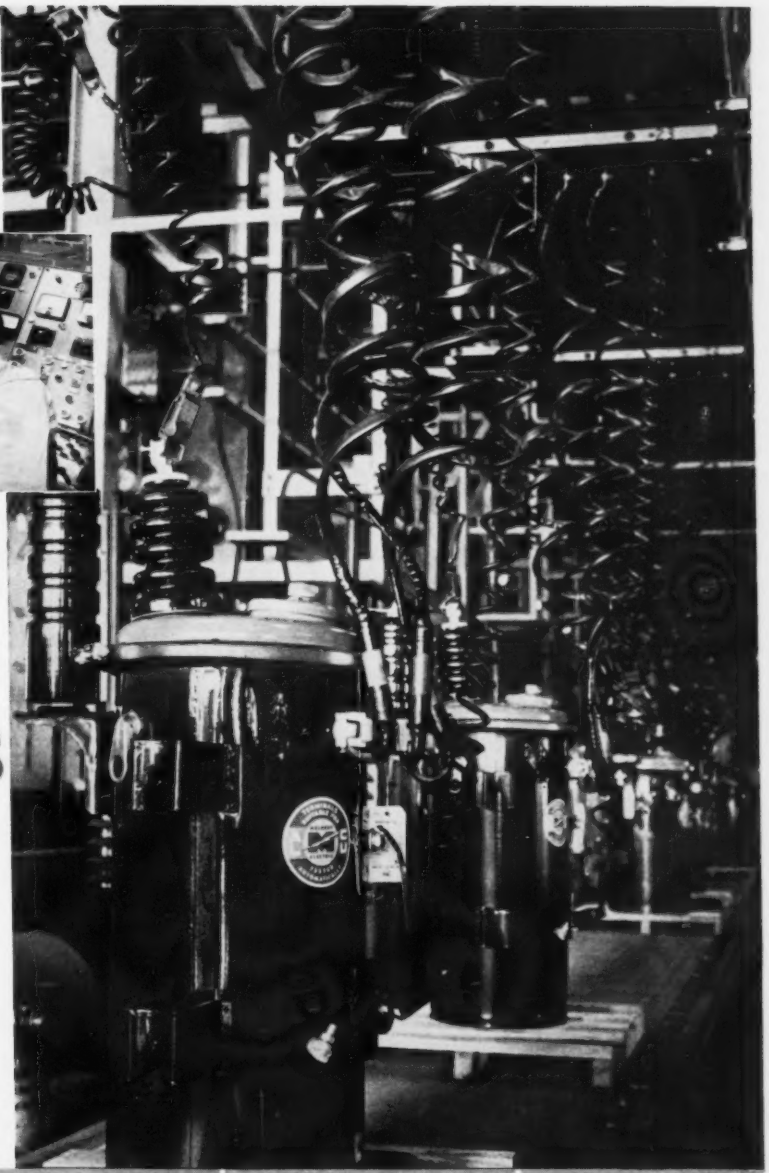
INDUCED POTENTIAL TEST
Proves turn, layer and divisional insulation quality of high and low voltage windings.

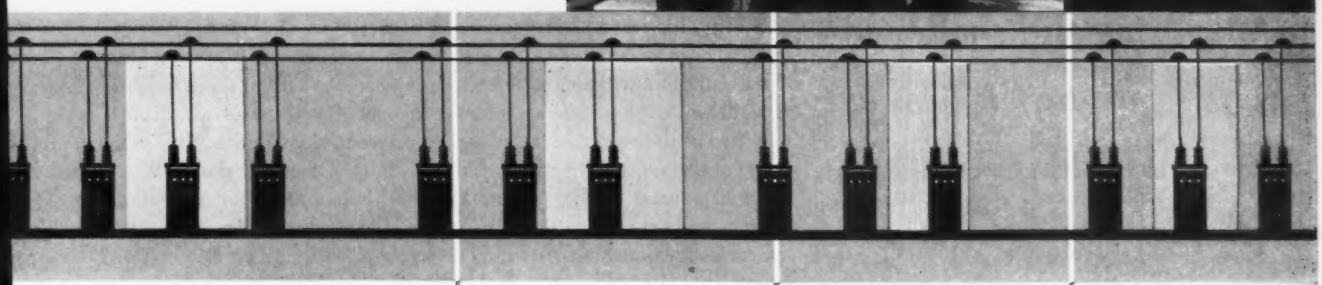
For phone number of closest representative see advertising index in back of book.

TEST SYSTEM—After completion of all assembly operations, a moving belt conveyor transports transformers through the automatic test system. Leads connecting the transformers to overhead dollies are attached before the transformers enter the test area. Power for each test is supplied...automatically ...by overhead bus at each test station.

CONTROL ROOM—Central control room houses all test station controls, test metering and recording equipment, and electronic rejection circuits.

TRANSFORMERS





APPLIED POTENTIAL TEST

A low-frequency, high-voltage test of insulation quality between high and low voltage windings, and between windings and ground.

CORE LOSS AND EXCITING CURRENT TEST

Equipment automatically measures the core loss and exciting current of each transformer.

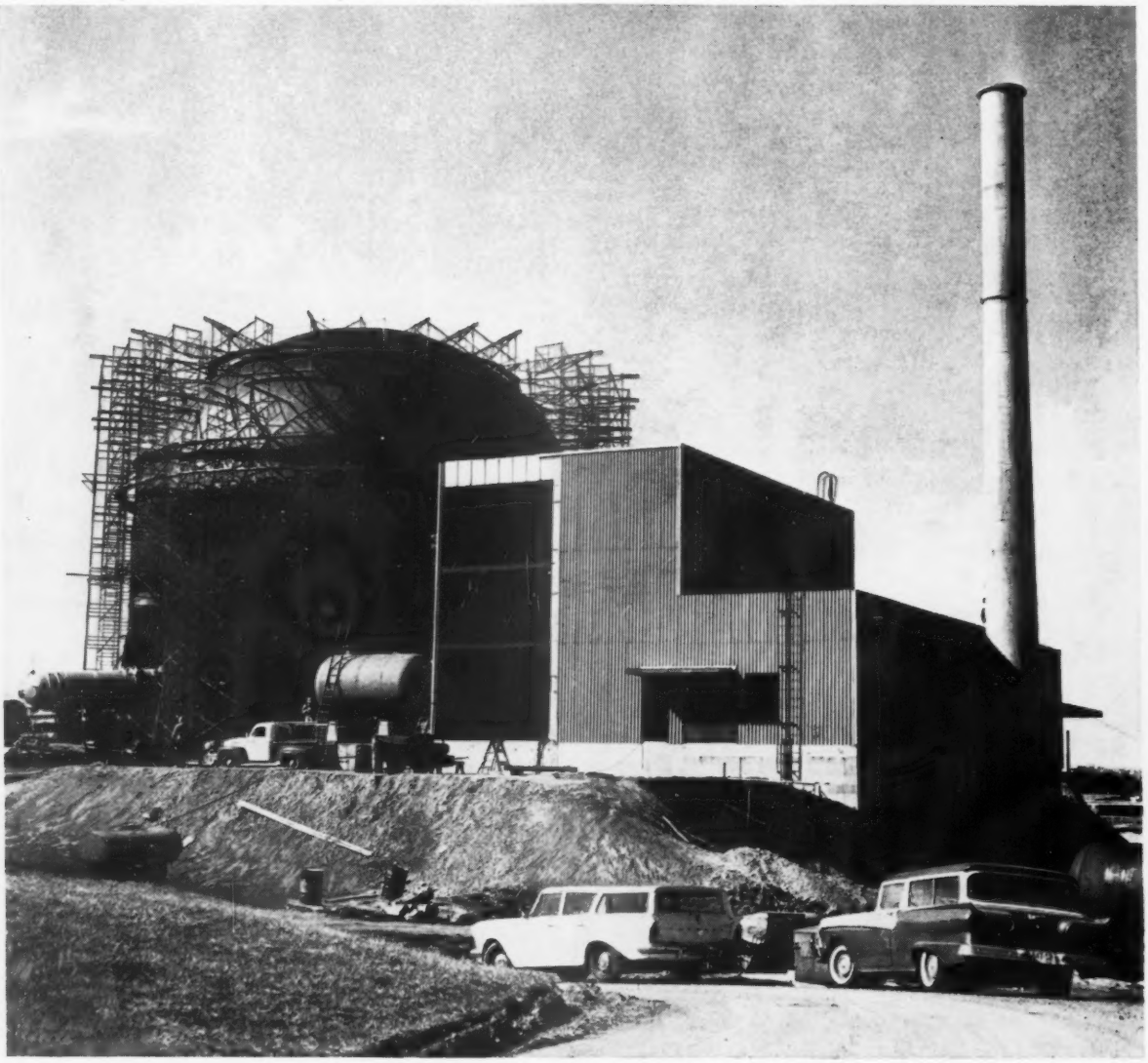
SOUND TEST

The audible sound level of every transformer is measured while the unit has normal excitation voltage applied.

CSP BREAKER TEST

When applicable signal light and breaker operation is checked under overload conditions for proper operation.

11,400 KW Organic Moderated Reactor plant for the City of Piqua, Ohio



The Peaceful Atom

Answering the challenge of the Sixties: to double the world's power output in ten years

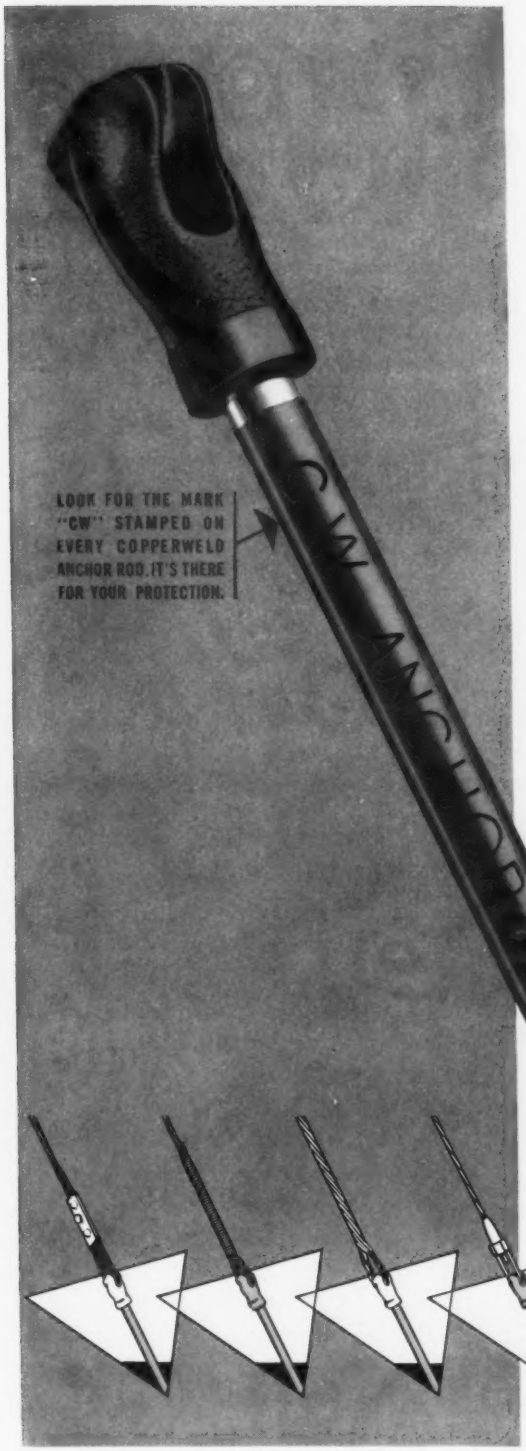
To meet increased living standards everywhere, the world's power resources must be doubled in the 1960's. In this great expansion the Peaceful Atom will play an ever-increasing role. Atomics International, a leader in developing nuclear power for over 15 years, is already building two of the world's most advanced power stations under AEC programs: the Organic Reactor plant at Piqua, Ohio and the Sodium Reactor plant at Hallam, Nebraska. Another promising concept is the Advanced Epithermal Thorium Reactor project, now being developed by AI for the Southwest Atomic Energy Associates, a group of investor-owned utilities. AI's experience and facilities will play a growing part in meeting the power challenge of the Sixties.

ATOMICS INTERNATIONAL

Division of North American Aviation

Pioneers in the creative use of the atom

World Headquarters: Canoga Park, California, U.S.A. Cable Address: ATOMICS. *Other offices:* Washington, D.C., U.S.A.; Geneva, Switzerland. *Affiliated with:* INTERATOM, Bensberg/Cologne, Federal Republic of Germany and DYNATOM, Paris, France



You get lasting security with Copperweld Anchor Rods

Because an anchor rod is used in the ground where its entire length cannot be seen, its holding power is often taken for granted. Yet, anchor rods are vulnerable—primarily at or just below the ground line. Here, the rods are subject to rusting and loss of strength due to the action of corrosive soils, moisture and air carried down by surface waters.

Only Copperweld Anchor Rods have a thick covering of copper molten-welded to a strong steel core. This method of manufacture assures lasting protection against corrosion. Since the copper cannot crack, flake or peel, the strong holding power of Copperweld Anchor Rods is always the same . . . protecting your overhead lines year in and year out.

Copperweld Anchor Rods are available in various lengths and diameters. For complete information on these non-rusting anchor rods, write for Engineering Bulletin E. D. 1883.

COPPERWELD STEEL COMPANY
WIRE AND CABLE DIVISION *Glassport, Pa.*
For Export: COPPERWELD STEEL INTERNATIONAL COMPANY, New York

FERROUS OR NON-FERROUS FITTINGS CAN BE USED WITH COPPERWELD ANCHOR RODS.

The threaded ends of each Copperweld Anchor Rod are heavily coated with pure tin to permit the use of ferrous or non-ferrous fittings.

Copperweld® anchor rods

For phone number of closest representative see advertising index in back of book.

RT&E INTRODUCES ARMORTEC

A New Lifetime Plastic Coating on All RT&E Pole-type Transformers —At No Additional Cost

The transformer industry has been missing the boat. In the last few years, development of various features in distribution transformers have been extremely rapid — transformers with dual voltage ratings, units designed for economical residential underground distribution, longer insulation life, and yet, all of us have been missing one of the most obvious areas where improvement in the distribution transformer should have been made — and that is in the finish that protects the transformer.

There have been paints and more paints developed for protection of distribution transformers; none really solving the problem. There is a better way of doing it which RT&E has recently adopted for all pole-type distribution transformers. This is a 100% solids system involving fusion bonding of pure vinyl to the transformer tank. We call it Armortec. This is a process radically superior to any paint finish now being used. It involves no solvent to dilute the solid materials in the finish and it involves no high pressure spraying to blow the covering material out of the crevices that need protecting.

Armortec is not a paint. It is a pure vinyl plastic. Dipped in the resin and fusion-bonded at 650°, the transformer tank, band, and cover is provided with a thick protective coating over all portions of the transformer, even sharp edges.

The superior adhesion quality is due to the fusion-bonding method using high temperature oven curing. The protective coating is of a uniform thickness, even on sharp edges and in corners. This uniform coverage fills in blind spots and corrosion traps present around lifting lugs, hanger brackets and accessories.

The fused on finish is also completely smooth. There is no problem with sag, pock and drip marks. Armortec will not chalk, crack or craze in weather and sunlight. It provides a lasting glossy, attractive appearance throughout the life of the transformer.

This process and the materials being used have been thoroughly tested in accelerated life laboratory tests equivalent to 20 years field service. These tests have shown that new Armortec finish is corrosion-proof, fade-proof and maintenance-free. There have also been three years of testing in the very worst climatic and corrosion conditions in Florida and Arizona. All of these tests show Armortec to be many times superior to paint in all respects.

This vinyl material can also be laid on the tank in much greater thicknesses than can paint. Normal paint is put on the tank between three and four mils thick. We are using 8 to 10 mils on the tank and about 20 mils on the cover and band. With this type of thickness on the cover, it also provides 1100 volts/mil of insulation, thereby eliminating outages due to birds and other animal life.

In addition, the mechanical properties of this material provide an extra tough resilient coating over the tank that resists chipping, cracking, scratching and other normal damage which can occur in handling the transformer between the manufacturer's warehouse and its final installation on the pole.

This Armortec finish is truly a lifetime transformer coating in all climatic or corrosive conditions encountered anywhere in the country. This outstanding finish is being provided *at no price addition.* It will be provided on all RT&E distribution transformers . . . and how can this amazing Armortec be provided on all units at no extra cost? The answer is simple. RT&E insists on the best and concentrates on a single idea — a better transformer. Here is a transformer finish that is radically new, and will solve all corrosion problems involved in a transformer installation.

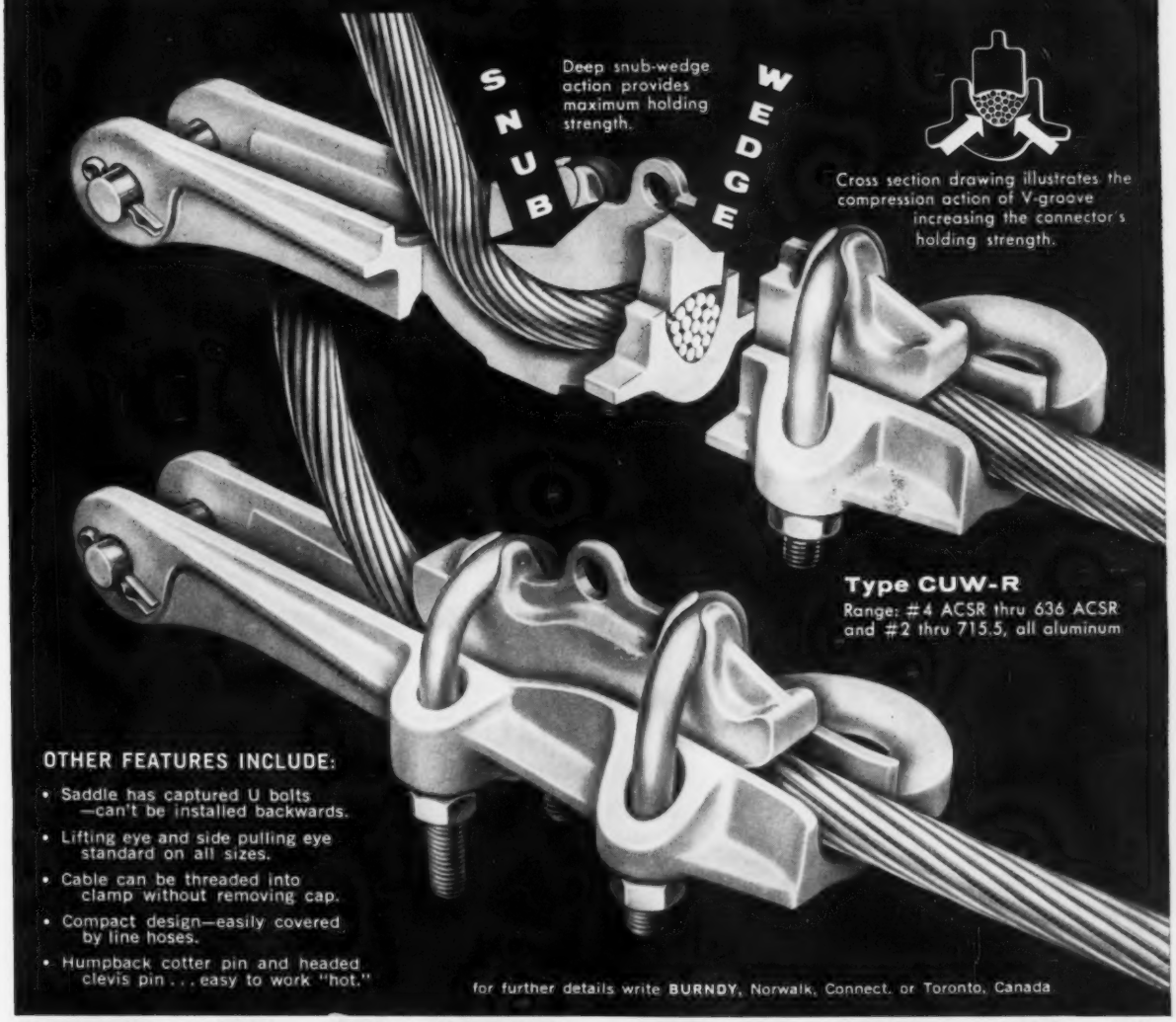
RT&E Corporation
Waukesha, Wisconsin
Portland, Oregon • Arlington, Texas

Ask your RT&E representative to demonstrate this Armortec finish.

3

get the inside story on this aluminum

DOUBLE ACTION
LOW COST
DEAD END CLAMP


SNUB
WEDGE
Deep snub-wedge action provides maximum holding strength.
Cross section drawing illustrates the compression action of V-groove increasing the connector's holding strength.

Type CUW-R
Range: #4 ACSR thru 636 ACSR and #2 thru 715.5, all aluminum

OTHER FEATURES INCLUDE:

- Saddle has captured U bolts —can't be installed backwards.
- Lifting eye and side pulling eye standard on all sizes.
- Cable can be threaded into clamp without removing cap.
- Compact design—easily covered by line hoses.
- Humpback cotter pin and headed clevis pin . . . easy to work "hot."

for further details write **BURNDY**, Norwalk, Connect. or Toronto, Canada

BURNDY

58-7

For phone number of closest representative see advertising index in back of book.

ANACONDA WIRE & CABLE IS MADE IN THE WEST TO FIT THE NEEDS OF THE WEST

FROM ORANGE, CALIFORNIA MILL . . .
A full line of wire and cable is ready to go to work for utilities, contractors, electrical manufacturers – all of Western Industry.

Fast, efficient service directly to you, from nearly 100 Western Anaconda Distributors . . .

FROM REDWOOD CITY, CALIFORNIA MILL . . .
A wide range of highly specialized products meets the exacting needs of the electronics and missile industries. This new Anaconda facility, the Sequoia Wire & Cable Company, rounds out Anaconda's complete wire and cable service to the West.

Call the Man from Anaconda at Sales Offices in Denver, Los Angeles, San Francisco or Seattle. Or see your local Anaconda Distributor. 61371

ASK THE MAN FROM
ANACONDA®
COPPER AND ALUMINUM WIRE AND CABLE

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Only the new

KEARNEY

UNIGAP

DISTRIBUTION VALVE
LIGHTNING ARRESTER
offers you the important
EXTRA *of* UNSURPASSED
DURABILITY VERIFIED BY
A NEW CONCEPT OF
ACCEPTANCE TESTING!

The exceptional durability and protective characteristics of Kearney Unigap Distribution Arresters have been thoroughly proven in an exhaustive program of service condition acceptance testing far more rigorous than present standards.

During this program, conducted at the Hubbard-Kearney Electrical Research Laboratory, Unigap arresters were subjected to unusually severe tests simulating actual service conditions and conclusively proved their capability to withstand some of the most severe conditions liable to be encountered in service. Unigap also proved to be the **only** arrester capable of successfully withstanding this complete series of acceptance tests.

Unigap Arrester durability and performance characteristics far exceed standards... discharge ability exceeds station arrester requirements...follow current interrupting ability is ten times normal service requirements.

Consistently low sparkover and permanence of characteristics are insured by "unitized" spark gap construction combining both gap and separate coil functions in one rigid, precision assembly. Rapid magnetic arc movement and power follow current are accomplished without an auxiliary coil. An improved valve element limits power follow current to values perfectly matched to the interrupting ability of the gap structure.

For full information about this outstanding arrester contact our West Coast Distributor:
MAYDWELL & HARTZELL, INC. LOS ANGELES • SEATTLE • PORTLAND • SAN FRANCISCO • SPOKANE • PHOENIX

510

KEARNEY **JAMES R. KEARNEY CORPORATION** • 4236 Clayton Avenue • St. Louis 10, Missouri
PLANTS IN ST. LOUIS • MELROSE PARK, ILL. • FAYETTEVILLE, ARK. • GUELPH, ONTARIO, CANADA • ST. THERESE, QUEBEC, CANADA

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KPF switches

Trouble-free Simplicity

of design, of operation

INSTALL KPF switches more quickly on hot or dead lines, at less cost. Just bore holes in crossarms, mount phase units, connect conductors. No precision requirements, no heavy extra mounting structures, no temperamental complex mechanism to bind, freeze, malfunction or need lubrication.

Rugged, lightweight KPF switches have proved their dependability and economy in half a century of major utility service. Make a test installation on your system—this month.

Fully closed.
Bell crank on crossarm, operated by control rod, will rotate switch blade arm clockwise away from stationary arm holding switch contact clip.

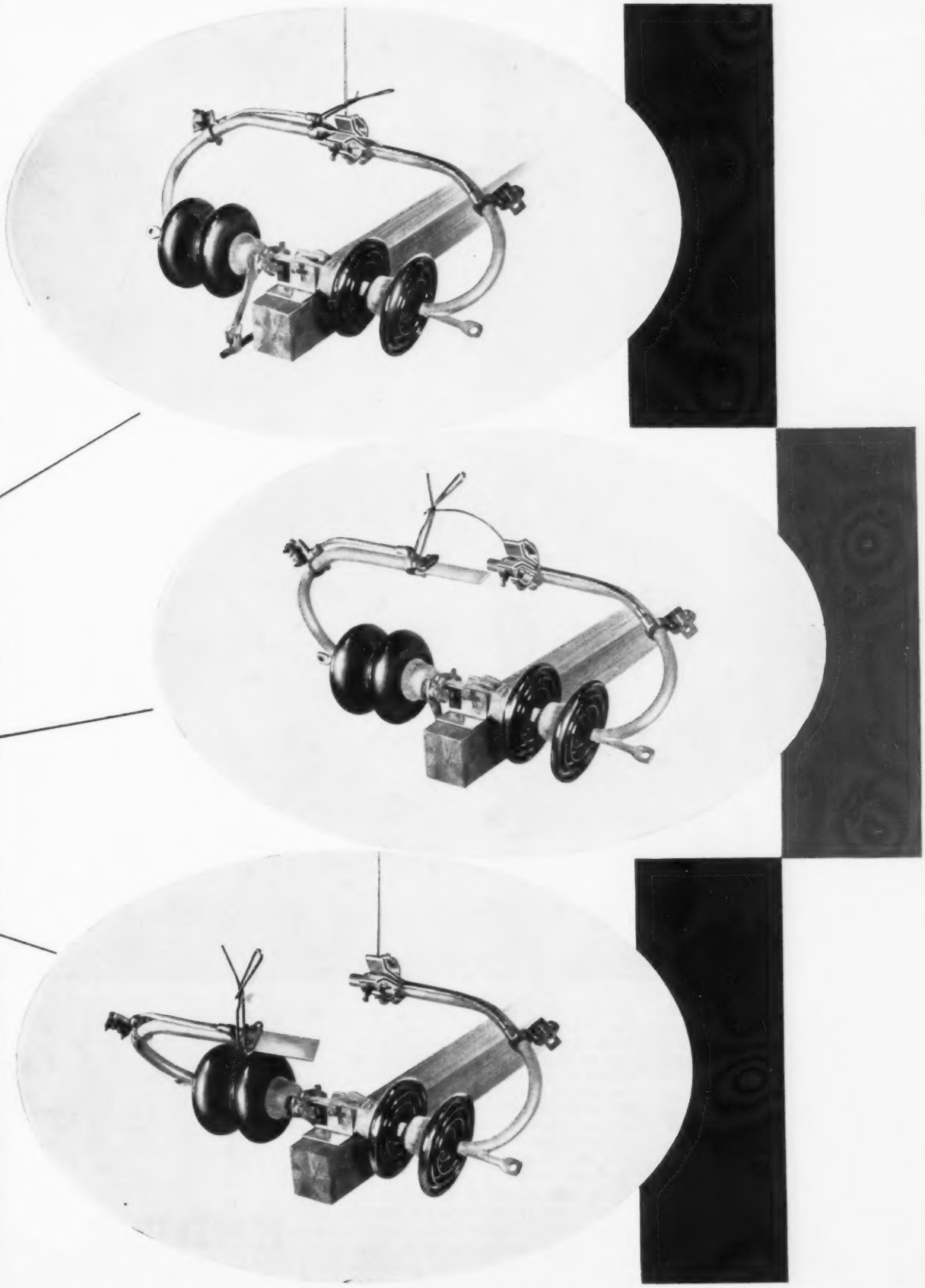
Switch blade arm partially rotated.
Switch blade has separated from clip. Quick-break whisker carries current, prevents arcing.

Switch fully open.
Quick-break has snapped free instantly, preventing arcing. KPF switches operate smoothly despite icing, crossarm warpage; never need lubrication.

KPF
AIR BREAK SWITCHES
Standard for half a century

KPF ELECTRIC CO.
P.O. Box 1257W • Stockton, California
HOward 4-8381 Area Code 209

5214



Found in an old desk

When this spool of tape was new, the twentieth century had not yet been born. Salty old Captain Brixey owned the Kerite business and was making cable history.

His Kerite wire had been used for a 300-mile railway block-signal system . . . the longest aerial cable of its time. A Kerite 1,000,000 circular mil power cable laid in the Gowanus canal was already ten years old in 1908 and "just as good today as it ever was and giving the best possible service."

One of the Captain's most colorful projects was the Kerite cable laid along the Panama Canal, the first telegraph connection between North and South America. The joints were made with Kerite splicing compound (Kerite insulation in tape form). These joints were not only dielectrically sound but had to match the cable insulation in terms of insulation resistance and capacity in every way. Thirty miles of this cable were submerged, but in jungle and water, cable and tape stayed in service for over forty years.

A lot of time has gone by since this spool was young.

Yet this old tape is apparently as flexible and strong as on the day it was made.

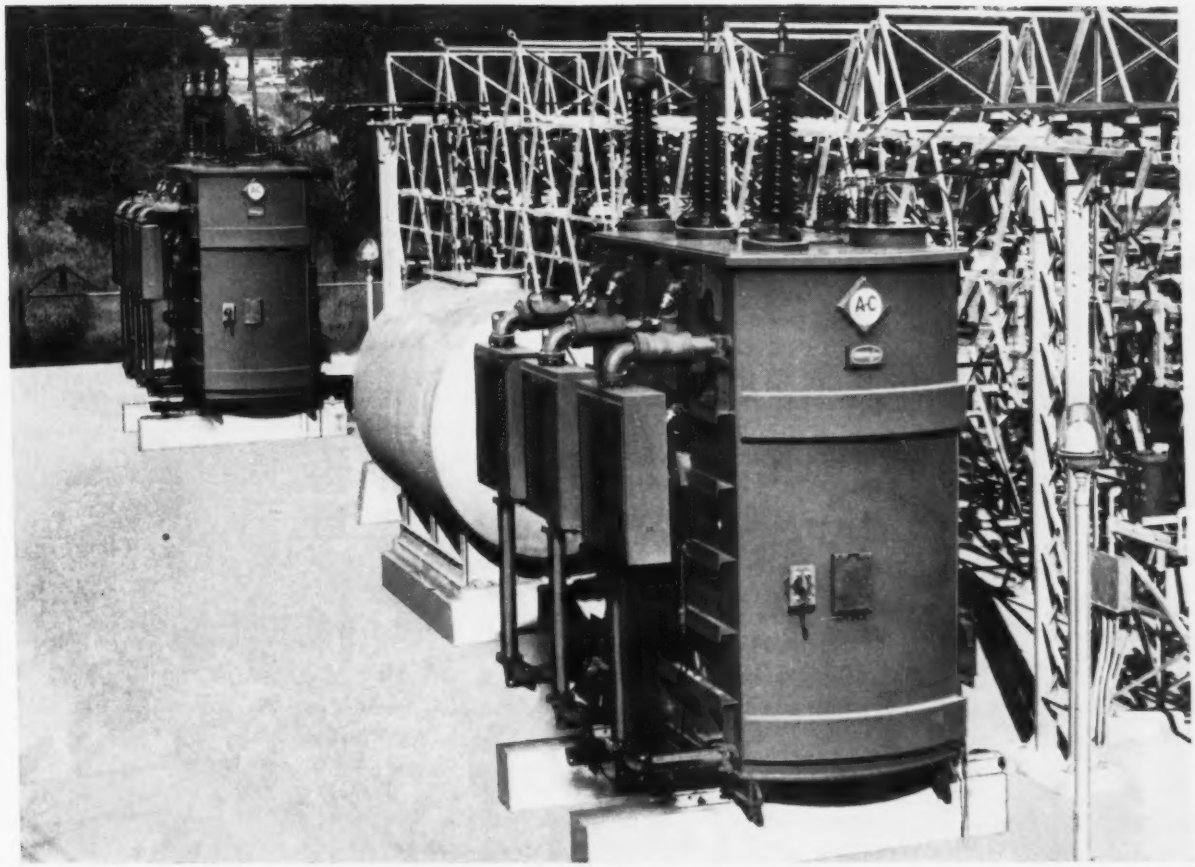
The Kerite Co., 30 Church St., New York 7, N. Y. Agents in all principal cities. A member of the Railway Progress Institute.

KERITE

Premium grade insulated wire and cable . . . friction tape, splicing compound tape, rubber cement.

ALLIS-CHALMERS

A-1461



Gulf Power Company's Bayou Chico Substation, Pensacola, Florida, uses 20,000-kva DUAL-COOLED transformers.

33% greater capacity

Dual-Cooling uprates either of two 20,000-kva transformers to 26,667 kva

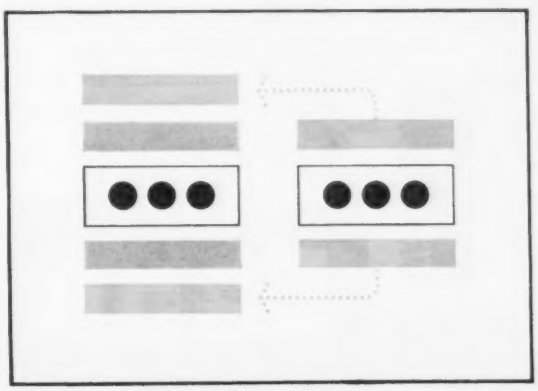
Now *Dual-Cooled* transformers offer both central stations and substations new opportunity to purchase *more* transformer capacity for *less money!*

With A-C dual-cooling, either of two 20,000-kva transformers, for example, can continuously carry 26,667 kva without loss of life.

Here's how it's done. In the event one transformer is off the line during an emergency, coolers from both units are connected to the functioning transformer. Emergency capacity of either *Dual-Cooled* transformer is increased one-third over its normal rating.

Dual-Cooled transformers are offered in any rating from 20,000 kva up. Contact your nearby A-C office for *Dual-Cooled* transformer application facts or write **Allis-Chalmers,** Power Equipment Division, Milwaukee 1, Wisconsin.

Dual-Cooled is an Allis-Chalmers trademark.



In dual-cooling, a transfer of coolers from one transformer to the other uprates the active transformer capacity 33%.

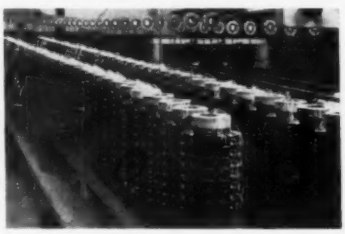
For phone number of closest representative see advertising index in back of book.

Exclusive Lapp Process Stabilizes Power Factor and Loss in Post Insulators

A LAPP LABORATORY REPORT

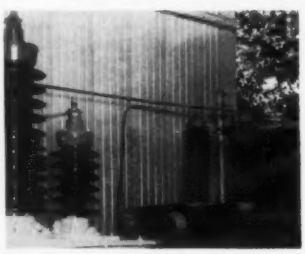
THE PROBLEM: Line Post and Station Post insulators occasionally have been found to show variation in power factor, charging current and watts loss under Doble tests. Field service seems not to have been impaired, but the phenomenon has been noticeable in such instances as erratic readings secured in tests of bushings connected to Post insulators.

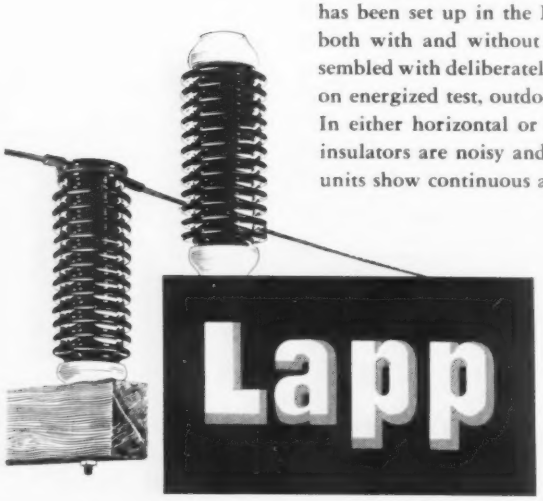
THE FINDING: Some years ago engineers of the Lapp Laboratory staff were assigned the job of tracing down the cause of such variations. It was located and identified as contamination deposits on the inside walls of the insulators. Porcelain bodies for Lapp Post insulators are subjected to a severe test for electrical soundness—a 3-minute flashover from the inside of the head around the body to the outside of the head. During this test the hole in the insulator fills with corona, and contaminating particles deposit on the walls of the hole; amount of this deposit and its effect on electrical characteristics vary with atmospheric conditions at the time of the test and at the time of plugging the hole for assembly.



THE SOLUTION: A thin coating of silicone applied to the wall of the insulator hole negates the effect of the corona contamination, and results in insulators dependably uniform in power factor, charging current and watts loss. Permanent effectiveness of the silicone coating is assured by its inherent chemical stability, and by the fact that the hole to which it is applied is sealed by the Lapp plug against weather, light, heat, or other physical or electrical attack. A Lapp patent is pending on the process.

THE VERIFICATION: All Lapp Line Post and Station Post insulator production for more than three years has incorporated the silicone treatment. The low initial power factor of the insulator has been maintained on every unit re-tested after service. In addition, in an effort to determine limits of effectiveness of the process, a series of insulators has been set up in the Lapp laboratory. Post insulators, both with and without the silicone treatment, were assembled with deliberately-defective plugs. They have been on energized test, outdoors, continuously for three years. In either horizontal or vertical mounting, all untreated insulators are noisy and show high loss. Silicone-treated units show continuous and unchanging low loss.

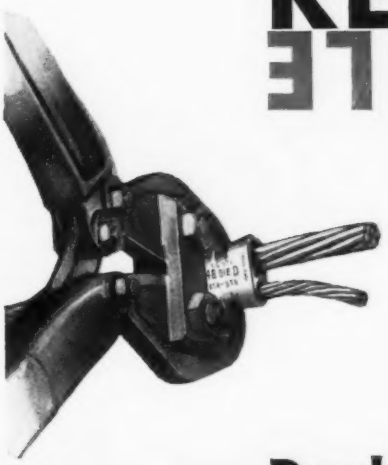




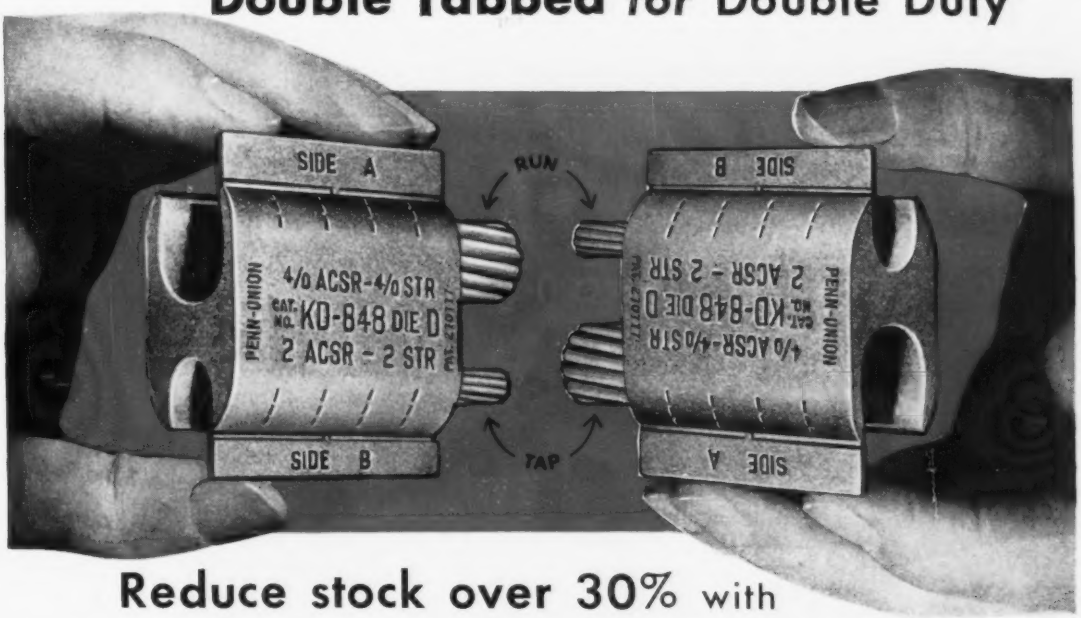
THE CONCLUSION: To the widely-known advantages, in electrical and physical performance, of its Post insulators, Lapp research has added the characteristic of stability in power factor, charging current and watts loss. *At Lapp, insulator design and production is a matter of continuous development and improvement.*

Lapp Insulator Co., Inc., Le Roy, N. Y.

REVERSIBLE



Double Tabbed for Double Duty



Reduce stock over 30% with

Penn-Union *Double-Tab* "Press-On"

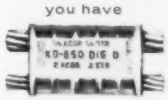
Less Stock— Reversible for dual application.

High Conductivity— E. C. Aluminum extrusions assure cool running high efficiency contacts.

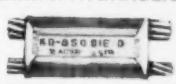
Easy Crimping— Fully annealed for easy installation— deep indent crimp lines.

Pre-Loaded Inhibitor— Cleaned contact surfaces kept free of oxide re-formation by non-dripping Penn-Union "Cual-Aid." In colored polyethylene bag printed with complete information.

Crimp with tools you have



HAND or HYDRAULIC



using O and D dies

Cu to Al— Heavy spacer provides conductor separation and prevents strand cutting. Also minimizes galvanic corrosion.

Weather-Protected— Full-length tab provides complete enclosure for inhibitor.

Cable Protection— Heavy chamfering of cable openings protects main and run.

The Complete Line— Double Tab cable sizes #6 through 4/0. Single Tab cable sizes to 400 MCM.

PENN-UNION ELECTRIC CORP., Erie, Pa.

Export Sales—Philips Export Co., 100 East 42nd St. New York 17, N.Y.

Sold by Leading Electrical Distributors

PENN-UNION *a good connection*

Catalog Sheets or Samples on Request

For phone number of closest representative see advertising index in back of book.

First from General Electric (1958)...
another bright idea that became a better lamp...Bonus Line Mercury

works 6,000 hrs. overtime, cuts your customers' costs

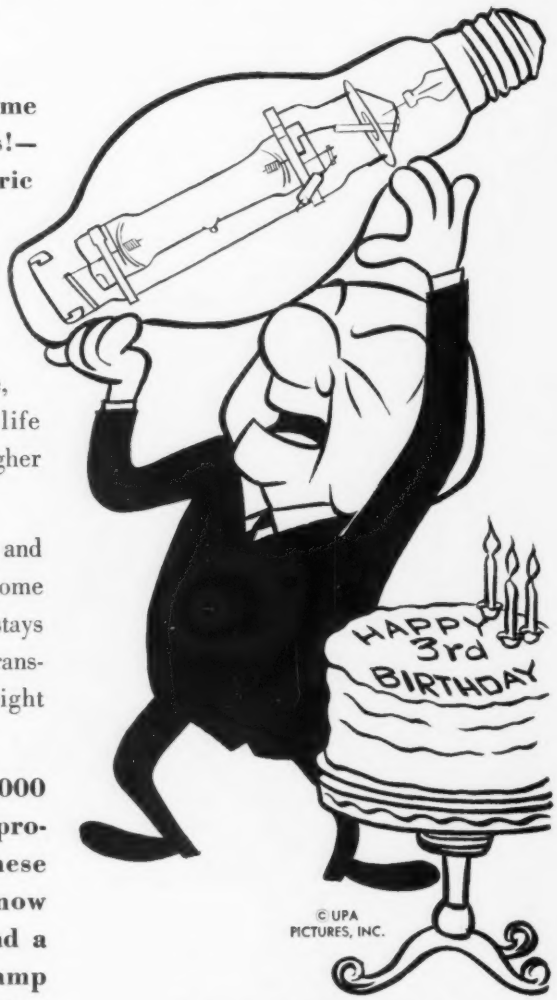
Nearsighted Mister Magoo says . . ."1958? How time flies! That's the year the Nautilus—gallant lads!—went under the North Pole, and General Electric developed the Bonus Line Mercury lamp. Happy birthday, Bonus Line. Egad! Who built the ship in this bottle?"

Look again, Mister Magoo. It's General Electric's special new electrode. Up through the 400-watt size, it gives your customers 12,000 hours of useful life *—or twice as much as the old non-bonus line.* And the higher wattages (700 and 1000) offer 50% extra useful life.

Compare these two arc tubes, and you'll see where the extra hours come from. Notice how the new one stays white instead of blackening. The translucent *white* deposit lets more light come through.

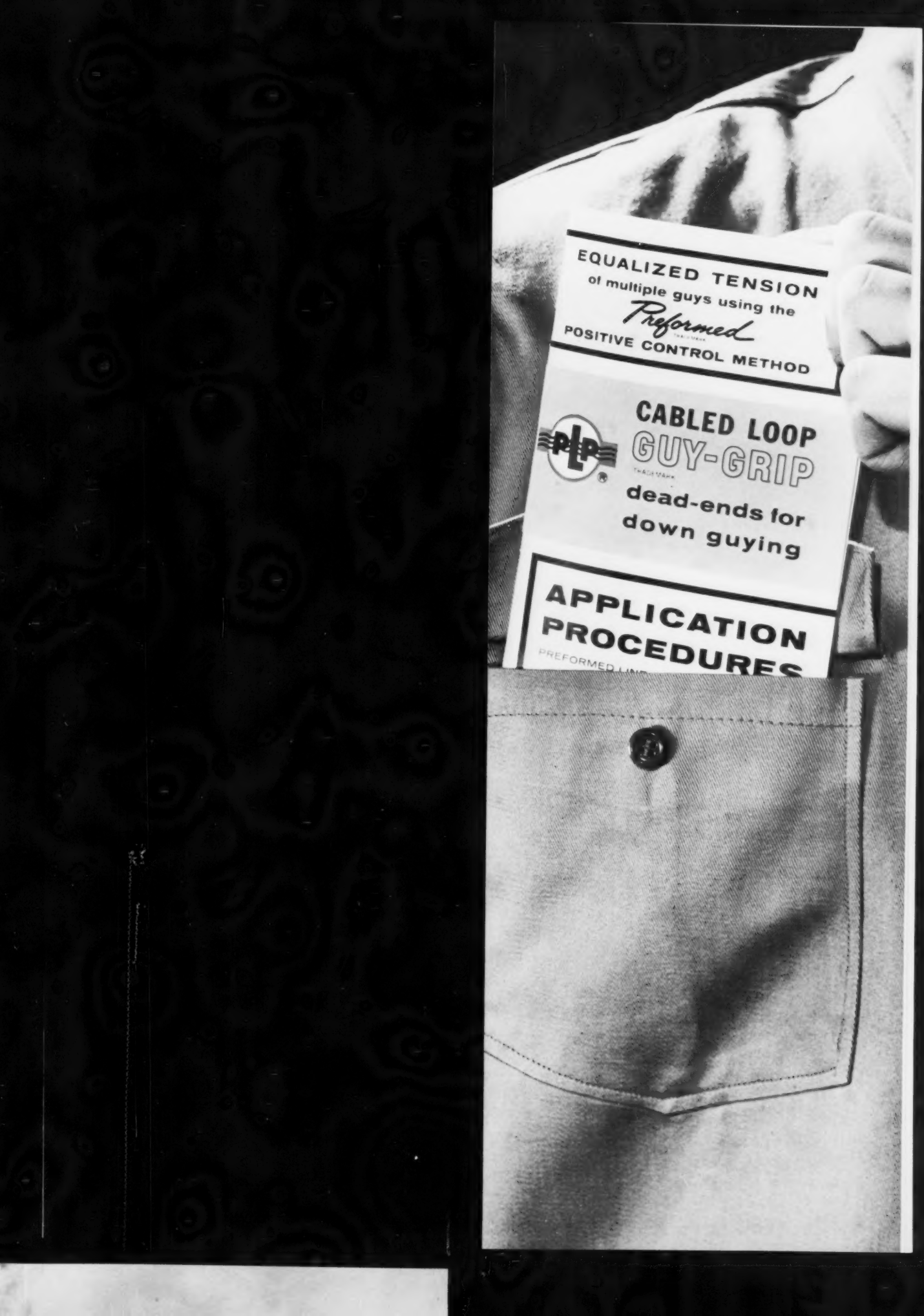
Result: more light after 12,000 hours than ordinary lamps produce after 6,000 hours. These extra hours are free. And now manufacturing efficiencies and a growing demand for this lamp enable us to reduce its price 15%. Other popular G-E 400-watt mercury lamps are reduced 8-13%.

Important: All G-E mercury lamps are now made only in *heat resistant glass*, to prevent glass deterioration. Ask your G-E distributor for more details. General Electric Company, Large Lamp Dept. C-19, Nela Park, Cleveland 12, Ohio.



Progress Is Our Most Important Product

GENERAL ELECTRIC


EQUALIZED TENSION
of multiple guys using the
Preformed
POSITIVE CONTROL METHOD
CABLED LOOP
GUY-GRIP
dead-ends for
down guying
APPLICATION
PROCEDURES

Here's how to get

EQUALIZED TENSION

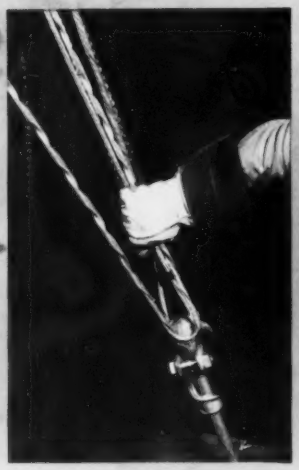
of multiple guys using the

Preformed
TRADEMARK

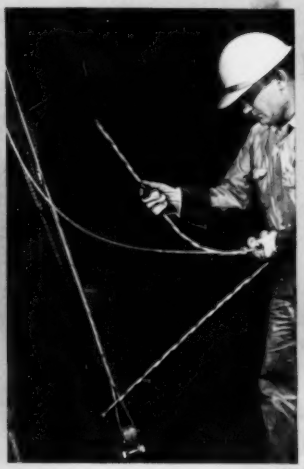
POSITIVE CONTROL METHOD

Write today for the new pocket-sized application booklet, or the file-sized brochure, covering *complete guying procedure* with the CABLED LOOP GUY-GRIP dead-ends.

Just follow these key



① Tension the new guy until the existing guy goes slightly slack —then cut the strand about 3" above the rod eye, and align the loop of the GUY-GRIP dead-end and the rod eye.



② Wrap one leg of the GUY-GRIP dead-end onto the strand several turns (as far as the *second* cross-over mark.)

EASIER with CABLED LOOP GUY-GRIP TRADEMARK dead-ends

PREFORMED LINE PRODUCTS COMPANY

5349 St. Clair Avenue
Cleveland 3, Ohio · UTah 1-4900
600 Hansen Way
Palo Alto, California · DA 4-2561

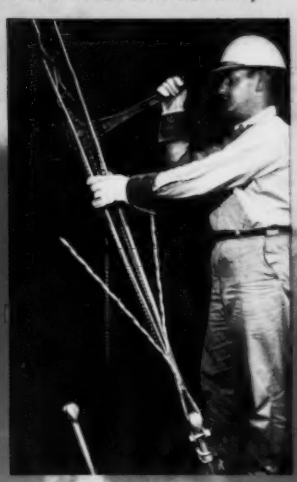
PLP® is a trademark which is registered in the U.S. Patent Office and is the property of Preformed Line Products Company.

You can look up to Preformed TRADEMARK

ey steps...

(shown here by a PREFORMED demonstrator)

③ Similarly wrap on the second leg of the GUY-GRIP dead-end as far as the second cross-over mark.



④ Back off the hoist until both guys are even. Complete the application of the GUY-GRIP dead-end to the strand. Repeat these steps for additional guys...

⑤ ...and you're sure the tension is equalized.

CABLED LOOP GUY-GRIP TRADEMARK dead-ends

SAFEST, FASTEST, and MOST ECONOMICAL method of multiple or single guying

- Easiest for all joint pole construction.
- Compatible materials.
- Easier guying with *high strength strands* — no strand bending required.
- No concentrated stress on strand.
- Less pole rake required.

The product in this advertisement is manufactured under one or more of the following: U.S. Patent No. 2,691,865 and 2,761,273; other patents pending.

NEWS

Edited for the electrical industry of the West

Utilities Will Fight For Right to Build Lines

Rocky Mountain area investor owned utilities plan a major fight before Congress for the right to build major power transmission lines for the Colorado River Storage Project. (See EWEST, April, p. 38.)

Robert T. Person, president of Public Service Co. of Colorado, said five utilities would unite in an effort to overturn decisions of former Secretary of Interior Fred Seaton and the present secretary, Stewart Udall. He said the Colorado firm will be joined by Arizona Public Service, Public Service of New Mexico, Utah Power & Light and Pacific Power & Light Co., which serves Wyoming.

Seaton decided, and Udall later concurred, that the federal government should build the power transmission system for the sale of power to preference customers in the five states.

The companies are gathering evidence charging that both the present and former secretaries were misled and that different sets of specifications were used in evaluating costs to consumers as well as net benefits.

Contract Terminated

A Reclamation Bureau short-term power sales contract with Montana Power Co. will be terminated April 30, 1962, the Interior Department announced.

This will make 25,000 kw of electric energy available to preference customers east of the Fort Peck power plant in the Missouri River Basin Project, Assistant Secretary Kenneth Holum said. Holum added that the power is needed to meet near-future requirements of preference customers.

Clarification Asked

Pacific Power and Light Co. and Riverton Valley Rural Electric Co. have asked the Wyoming PSC for a clarification of service area rights in the Lander-Riverton area.

Riverton Valley has obtained a district court injunction to prohibit Pacific from proceeding with construction of power lines north and west of Lander until the dispute is settled.

Riverton Valley contends that Pacific was invading its service area and constructing power lines too close for safety.

The REA asked the PSC to specifically divide the territory and to rule which company should serve new consumers in the area.

Pacific holds service rights in an area extending 10 miles in all directions from its transmission line between Riverton and Lander. The REA also holds service rights in this area and in territory beyond the 10-mile limit, through an order issued later than the certificate held by Pacific.

REA to Build Lines

Colorado-Ute Electric Assn., a combine of eight Western Colorado REAs, has awarded contracts for immediate construction of transmission lines to take all Bureau of Reclamation power to be produced on the Collbran project in western Colorado. REA approved a $2,920,000 loan for the project.

Irby Construction Co., Jackson, Miss., was awarded a $1,213,000 contract to build the line and Jelko Inc., Salt Lake City, a $607,000 contract to build substations. Colorado-Ute already has spent $250,000 on other electrical equipment.

Colorado-Ute rejected a proposal by Public Service Co. to wheel power for the REA on a new line it offered to build.

► President Kennedy has asked Congress to **increase the number of FPC commissioners from five to seven,** stating that faster action by the commission on some construction permits would mean more jobs for the unemployed. He also asked that small natural gas producers and some pipe line construction be exempted from jurisdiction, and that legislation be passed to protect the gas consumer.

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Public Power Group Files on Mountain Sheep

Inclusion of the High Mountain Sheep plan for Snake River development in its present Nez Perce application before FPC was authorized by the Washington Public Power Supply System.

According to Owen W. Hurd, managing director, the action was taken to prevent "costly delay in power development and to insure that an opportunity exists for public development of the remaining undeveloped and unlicensed reach of the Middle Snake River." He said, however, that WPPSS reaffirms its contention that the Nez Perce project as proposed is better adapted to comprehensive development of the Middle Snake and Salmon Rivers.

Explaining that the Federal Power Act requires FPC to give preference to states and municipalities in issuing licenses, he said that the action "was designed to remove any doubt about the Federal Power Commission's recognition of the WPPSS preference position with respect to the issuance of a license for development of the Middle Snake."

Pacific Northwest Power Co.'s application for its High Mountain Sheep project is now before FPC.

Bill Puts REAs Under Commission

A bill, passed unanimously by the Colorado Legislature, places all rural electric cooperatives under the jurisdiction of the state Public Utilities Commission.

The measure gives the commission responsibility for conducting hearings and rendering decisions on territorial disputes between private investor companies and REAs.

Some REAs in the state have been regulated by the PUC and others have been outside its jurisdiction in the past.

The measure finally adopted by the legislature represented a compromise. The REAs originally supported a measure that would have prevented suppliers of electrical energy from building a new line to serve a new customer if that customer was within a mile of another supplier's line. It also would have provided that REAs would continue to serve areas taken into a town or city served by another supplier.

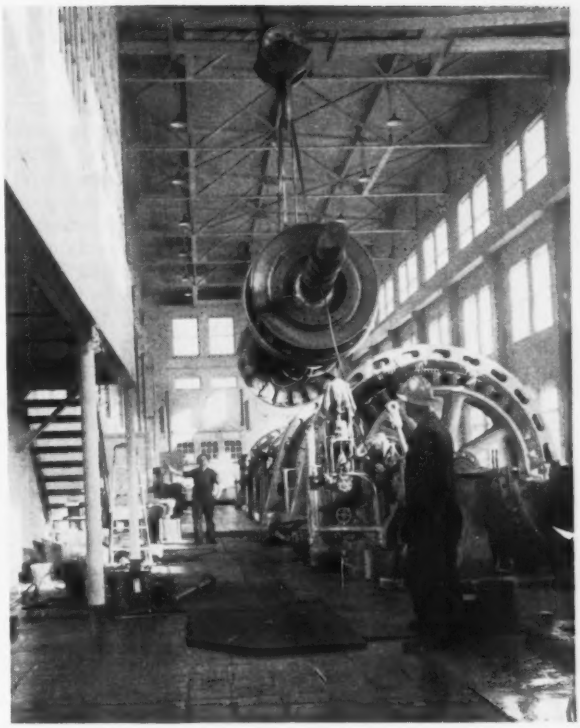
Peace River Project May Be Curtailed

The Peace River Power Development in northern British Columbia may be reduced sharply from original plans. W. C. Mainwaring, president of Peace River Power Development Co., indicated that this might be the result of studies made by the company to see how this project could be started under varying conditions.

The first phase could be curtailed to a $100 million construction of the smaller of two dams known as Site 1, leaving 600-ft main Portage Mountain Dam until later.

In any event, the project will not proceed until after B. C. Energy Board issues its findings next August regarding the Columbia River situation and whether Columbia and Peace can be coordinated and built simultaneously.

Mainwaring said that the company had its application ready to submit to PUC, but must hold back until the power picture is clarified. The original development plan was around $630 million.



UP SHE GOES! A 25-ton water wheel is hoisted aloft at the Rainbow power plant of the Montana Power Company near Great Falls, Mont. The water wheel will be replaced with a new cast steel turbine runner as repair and maintenance at the plant gets under way at the 36,000-kw generating station, one of five in a 16-mile section of the Missouri River. Altogether, Montana Power has 14 generating stations, including a steam-electric plant at Billings. Men in the picture above are Russ Swaby, foreground, and Tom Olds, directing the crane

Damage Suits Will Be Filed

Los Angeles Board of Water & Power commissioners announced that it has authorized City Attorney Roger Arnebergh to take prompt legal steps to recover damages from large electrical equipment manufacturers involved in the recent antitrust convictions. Suit will be filed for triple damages, sustained in purchases of electrical circuit breakers similar to those described in actions filed in federal court in Pennsylvania by the U. S. government.

Purchases of this type during 1951-60 amounted to more than $8,000,000. In addition, at least $11 million were spent for other electrical equipment of the type involved in the suit. How much of the $19 million minimum total is subject to triple damages will be determined by studies being made by a department analyst.

Sacramento Municipal Utility District officials have said that the utility may sue for overcharges on $2,652,000 worth of circuit breakers. E. K. Davis, general counsel, said SMUD would base its overcharge claim on the federal government's contention that its agencies were charged 40% more than the prices that would have prevailed in an open market.

In addition to the circuit breakers, SMUD bought about $7,500,000 of other equipment from suppliers convicted in the antitrust action.

The State of Washington will bring a multimillion-dollar damage suit against electrical equipment manufacturers, according to Attorney General John J. O'Connell. Filing is expected in June after O'Connell's office has completed an examination of purchases made by municipalities and PUDs during a five-year period.

► **An FPC examiner ruled to dismiss** petition of the city of Colton, Calif., to put Edison company's sales of electric energy to the city under FPC jurisdiction. He said that sales of electric energy generated at Hoover, Davis and Parker dam plants were intended to be under jurisdiction of the Secretary of the Interior and that the Congress gave Interior jurisdiction over rates to be charged distributors in the absence of regulation by the state in which the energy was sold.

► A 1961 legislative act **abolishing the Oregon Hydroelectric Commission** and transferring to the state engineer its function of acting on applications to build hydroelectric projects became law with the governor's signature. The state engineer must refer hydro applications to the Oregon Water Resources Board for hearings and recommendations.

Contractor Brings Suit

A suit filed in Pierce County Superior Court against Tacoma City Light by its contractor on Mayfield Dam may be expanded to determine whether the project is affected by initiative 25, which bars construction of dams on the Cowlitz River and other tributaries of the lower Columbia.

Perini Corp. of Framingham, Mass., holder of a $10 million contract to complete the dam, brought the suit to clarify certain phases of its contract with the city. Ivan T. Sampson and Robert R. Groves, Perini subcontractors, contend Perini's contract is invalid because of passage of the initiative.

The city holds the initiative does not apply, because the project was authorized by FPC before the initiative was proposed.

► **Tacoma's Public Utility Board** has purchased a second double-ended substation from the Westinghouse Electric Corp. on its low bid of $85,962. Tacoma had purchased one at that price in February and had been so pleased with the bids it had decided to advertise for another, according to A. J. Benedetti, acting utilities director. A unit substation purchased previously by the city had cost more than $150,000.

Suit Filed on Buffalo

Montana Power Co. has filed petition with the Federal Power Commission to intervene in the application of the Salish and Kootenai Indians for a preliminary permit at Buffalo Rapids dam sites.

J. E. Corette, president and general manager of the utility, said the company on March 8 filed with the FPC in Washington, D. C., an application for license to build dams for development of the Buffalo Rapids area of the Flathead River below the Kerr plant.

The confederated Salish and Kootenai Tribes of the Flathead Reservation have applied for preliminary permit covering the identical reach of the river, Corette pointed out. However, if the Indians' preliminary permit is issued, Montana Power would be forced to seek other sources of supply. This would, at the least, postpone for an indefinite period any further development of this reach of the river, the company said in its petition.

► **Estimated cost** of Portland General Electric Company's 300,000-kw Round Butte project on the Deschutes has dropped $4,670,000, because of more favorable prices on electrical equipment and construction. Explaining the reduction, the utility said in its annual report, "Reduction of the estimated cost of the project is based on competitive bids received on such major items as turbines, generators and transformers, coupled with an actual price escalation to date that is considerably less than had been anticipated."

► The California Assembly public utilities and corporations committee **rejected a bill which would have required publicly owned utilities selling electricity and gas to pay school taxes.** Assemblyman Sheridan Hogland (D) of LaMesa, sponsor of the legislation, estimated a tax requirement on public utilities would raise $27 million a year for the support of schools. "Public power," Assemblyman Hegland told the committee, "is a big boy now, doing a good job and doesn't need subsidies in the way of hidden taxes."

► Brtitsh Columbia's Legislature has instructed the government to **consider taking over three utilities,** B. C. Electric, West Kootenay Power & Light and East Kootenay Power. Earlier in the session, Premier Bennett had said that if some fair adjustment could not be secured from Ottawa on B. C.'s share of corporation tax, the province would be forced to take over B. C. Electric.

► **Acquisition of electric and water service properties** of Southern Wyoming Utilities Co. in Rock Springs and Green River, Wyo., and a power plant of Union Pacific Coal Co. in Rock Springs has been completed by Pacific Power & Light Company. Price for the properties, agreed to earlier: $3,200,000 as of Dec. 31, 1960, plus capital improvements since that date.

Management Conference

Seattle City Light recently conducted an intensive three-day management conference on communications and leadership at the headquarters of its Skagit hydroelectric project and is considering a second conference for lower-echelon supervision.

The first workshop, conducted by two University of Washington professors, was confined to about a dozen members of top management. Sessions extended from 8 a.m. to 9 p.m., with time out only for meals. Topics included "Leadership and Understanding Human Behavior," "Basic Factors in Communications Process," "Role of Leadership," "Leadership Through Idea Development" and "Decision-Making."

The conference was held on the Skagit, some 80 miles from Seattle, to free the officials from distractions but to keep them available for necessary decisions.

► **A new one-year contract** between Washington Water Power and Electrical Workers, Local 77, has been approved. It provides an increase in the hourly rate for journeyman linemen from the present $3.37 to $3.51.

► Employees of **Hawaiian Electric** Co. have ratified a two-year contract that calls for an 11¢ across-the-board increase in hourly wages for 1935 workers, plus classification adjustments of 3 to 11¢, and a wage reopening next Feb. 28. Heco's wage range under the new terms will be $1.66 to $3.49 an hour. IBEW Local 1260 had threatened a strike.

► A new contract with Local 483 of the IBEW, approved April 12 by the Tacoma Utility Board, gives a 4.15% wage increase to nearly 330 **Tacoma City Light** employees and a larger increase to nine electrical inspectors. Journeyman linemen were increased from $3.37 to $3.51 an hour and inspectors to $3.73.

Investment Plans Up Since Last Survey

Business now plans to spend only 1% less this year for new plants and equipment than it did in 1960, according to McGraw-Hill's 14th annual survey of business' plans for new plants and equipment, 1961-64. This is a modest increase in investment plans since McGraw-Hill's survey last fall. And advance plans for 1962-64 are almost as high as expenditures planned for this year. Other highlights of the survey:

Manufacturers are gearing investment plans to modernization. They are devoting 70% of this year's planned expenditures toward that purpose—the highest percentage ever recorded in the surveys.

Manufacturing companies were operating at an average rate of 77% of capacity at the end of 1960. They plan to increase their capacity at a rate of slightly more than 3% per year over the next four years, a much more modest rate compared with early postwar years.

Manufacturing companies expect unit sales to rise 3% this year and another 20% by 1964. The expected rise in sales over the three years ahead is double the planned increase in capacity. If sales expectations materialize, operating rates would be close to preferred levels and, in some industries, a need for new expansion programs would arise.

The flow of funds from depreciation will rise 8% this year and another 16% by 1964. Cash flow—depreciation plus retained earnings—is expected to increase 9% this year.

American industry is continuing its emphasis on research and new product development programs. R&D performed by industry will amount to $10.5 billion this year and $11.7 billion by 1964. These R&D efforts will assure a continuing flow of new products and new processes. Manufacturers estimate that 14% of their 1964 sales will be in new products.

Financial Notes

► **Hawaiian Electric** Co. has filed a registration statement with SEC for a proposed $12 million first mortgage bond offering. Dillon, Read & Co. and Dean Witter & Co. are named principal underwriters.

► Although its operating income last year amounted to $2.17 per share as compared with $1.93 in 1959, **Hilo Electric Light** Co. report-

ed a loss because of last year's disasters. Net operating profits last year were $500,838 as compared with $405,253 in 1959. However, the $1.8 million loss (partially offset by tax credits) resulted in a 1960 loss of $49,288. The company will relocate its central generating plant damaged by the Hilo tsunami, and it said 1961 should continue to show an improvement above normal.

► **Southern California Edison Co.** sold $30 million of its first and refunding mortgage bonds, Series N, due 1986, to bidders headed by Blyth & Co. The 25-year bonds were awarded on a winning bid of 100.481 for a 4½% coupon, giving Edison an annual money cost of 4.468%. Proceeds will be used to retire outstanding short-term borrowing and to help finance the company's continuing construction program.

► **Pacific Gas and Electric Co.** paid 1960-61 property taxes totaling $68,633,894. The company's total tax bill for 1960, including a $74 million U. S. tax on corporate income, amounted to $167,060,000. This amount is almost equal to wages paid all operating employees plus the entire net income available for stock dividends.

► **B. C. Electric's** gross revenue exceeded the $100 million mark in 1960 for the first time, according to the company's annual report released recently. Net profit was $11,197,249, down slightly from 1959.

► **Southern California Edison Co.** reported gross revenues for 1960 exceeding $300 million. Net income was $50,979,532, $4.57 a share, representing an increase over 1959 of 77¢ a share. This increase was largely attributed to the company's use of the "flow-through" method of accelerated tax depreciation adopted by the California PUC. Taxes, the largest single item of expense, amounted to $81,607,956 or 27¢ of each dollar of revenue.

► **Pacific Power & Light Co.** reported operating revenues of $63,255,000 for 1960, an increase of $5,494,000 over 1959. Electric service revenues increased 10.4%, due in part to a rate increase authorized in Oregon. Operating expenses of $42,980,000 were up $3,006,000.

► **Grant County PUD** commissioners have authorized the utility to redeem some of the revenue bonds issued for construction of Priest Rapids Dam. The authorization affects 117 bonds with a total face value of $117,000. This is part of a $166 million issue. Interest from more than $6,000,000 worth of federal bonds will finance the redemption.

► **Sierra Pacific Power Co.** has filed application for authority to sell $6,500,000 of first mortgage bonds, due in 1991, and 132,570 shares of common stock, par value $3.75 per share. The bonds would be sold at competitive bidding. The stock would be offered to the company's present common stockholders on the basis of one share for each 12 held, with an oversubscription privilege subject to allotment. Proceeds would be used to repay bank loans, reimburse the company for previous construction expenditures and finance additional construction.

► **Hawaiian Electric Co.** reports that 1960 was its most profitable year with peak demand up 8.9% over 1959 and an average growth rate of 8% annually predicted for the next few years. Corporate net income was $4,200,000, $3.59 a share, up from $3.28 the previous year. Total revenue was $30.7 million, up from $27.2 million. **Honolulu Electrical Products Co.**, wholly owned subsidiary, had a net profit of $370,000.

► **California-Pacific Utilities Co.** has been authorized by the Wyoming PSC to issue $2,000,000 in first mortgage bonds. It will sell the 30-year bonds, bearing 5% interest, to Pacific Mutual Life Insurance Co. and John Hancock in a private sale. Proceeds will be used to finance part of the company's 1961 construction program.

► A $500,000 electric revenue bond issue has been sold by **Franklin County PUD** of Pasco, Wash., to Foster & Marshall and associates. Effective interest rate is 3.7841%. The bonds will finance construction.

► **Public Service Co. of Colorado** reported that gross revenues for 1960 were up 12.2% to $112,689,000. Net profit, $13,809,000, was up 19.8%. Earnings per share of common were $3.21, compared with $2.65 in 1959.

► **Sierra Pacific Power Co.** shareholders have voted to split the company's common stock two for one. Results will be 1,590,832 shares outstanding of 2,500,000 authorized.

GROWTH

Northwest Power Survey

A serious power shortage could develop in the Pacific Northwest within 10 years in a low-water year if construction schedules are not maintained on hydroelectric projects, according to estimates prepared by the Pacific Northwest Utilities Conference Committee.

The forecast makes no allowance for Canadian water storage under the new Columbia River power pact nor for atomic power from a proposed nuclear reactor at Hanford Works. It was prepared by a subcommittee headed by Marshall L. Blair of Washington Water Power Co. and released to the committee at a meeting in Tacoma.

New generating plants under construction or planned will increase capacity from 9,932 to 14,249 mw but demand will increase even faster, leading to a 2,608-mw shortage if water storage in 1971 should drop to the 1936 level, the committee declared. Steam capacity of 561 mw could not meet the difference.

Agua Fria No. 3

A large new source of electric power was made available to the Salt River Valley recently when the $22 million unit No. 3 at the Salt River Project's Agua Fria steam generating plant near Glendale, Ariz., was put into operation.

Synchronization of Agua Fria's Unit 3 with the project's power system and the Central Arizona Power Grid took place following a series of exhaustive tests of all components of the new 168,000-kw generating facility.

Army Engineers' Plans

Bids for initial work on two major hydroelectric projects in the Pacific Northwest will be opened in early May, according to a tentative schedule released March 31 by the Army Corps of Engineers.

The Corps' Seattle district office plans to open bids about May 2 for exploration drilling at the Libby dam site on the Kootenai River in Montana and its Walla Walla district office expects to open proposals a week later for similar work at the site of proposed Little Goose Dam on the Snake River in southeast Washington. Each drilling project is expected to cost about $50,000.

Libby Dam will be a high struc-

ture costing about $322 million and providing about 5,000,000 acre-ft of storage. Its construction will be made possible by Canadian ratification of the Columbia River treaty with the United States, expected late this year. Planning funds totaling $350,000 are being requested by President Kennedy.

Little Goose Dam is the third in a series of four on the Snake River between its confluence with the Columbia River at Pasco, Wash., and Lewiston, Idaho. Ice Harbor Dam, the first, is nearing completion and Lower Monumental, the second, is slated for first heavy construction this summer. Planning funds of $150,000 are being asked for Lower Granite Dam, the fourth.

Iron Gate Change

The Federal Power Commission has amended a license issued to California Oregon Power Co. of Medford, Ore., to allow the company to construct a $6,585,330 hydroelectric project on the Klamath River in Siskiyou County, Calif.

California Oregon's proposed Iron Gate development will consist of an earthfill dam about 173 ft high creating a reservoir with a storage capacity of about 58,000 acre-ft, a concrete spillway, tunnel, power conduit, intake structure, a power house with an installed capacity of 18,000 kw and appurtenant facilities. The primary purpose of the dam is to regulate stream flows.

As originally licensed on Jan. 13, 1960, the proposed Iron Gate development would have been a reinforced concrete arch dam, about 65 ft high, used solely to regulate river flows. The cost of this construction was estimated at about $1,835,000. In 1967 Copco planned to increase the height of the dam to 170 ft and build a power house with an installed capacity of 25,000 kw. The original FPC license did not authorize Copco to build any of the second-stage facilities.

In its application for an amended license, Copco said it would be cheaper to build a single-stage earthfill dam than the two-stage concrete arch dam.

► **Portland General Electric** Co. has set Nov. 1 for the call for bids on construction of the dam, power house and power tunnel of its $68 million Round Butte project on the Deschutes River in central Oregon.

Contracts for diversion tunnels and grouting tunnels for the 440-ft rockfill structure, expected to exceed $1.5 million, will be called June 1.

WASHINGTON REPORT

$100 Million More Asked in Kennedy Budget

More than $100 million for power-related projects have been added by President Kennedy to the earlier Eisenhower Administration's budget proposals for public works spending in fiscal year 1962, beginning July 1.

Most of the increase asked by Kennedy comes from a $50 million hike in loan funds for the Rural Electrification Administration; Kennedy also would add another $30.1 million to the Eisenhower budget request for the Atomic Energy Commission (principally to build generating facilities at the Hanford, Wash., plutonium reactor); and most of the remaining increase would be used to start, or speed up, work on federal transmission lines.

The new Kennedy budget request actually provides for $60 million in funds during fiscal 1962 to build the Hanford generating plant (two units of about 350,000-kw capacity)—half from higher appropriations, the rest from an internal shifting of AEC allocations, reducing operation and maintenance funds. The Kennedy AEC budget would total $2,628,150,000, compared to Eisenhower's $2,598,050,000.

A special $300,000 appropriation for a study, by the Bureau of Reclamation, on possible federal transmission interconnections between all federal regional power systems, may have particular significance for the West. This study would look into benefits that might be achieved through interconnecting—such as the proposed Bonneville-to-California intertie—all "existing, planned and potential river basin power systems" as a means of increasing firm capacity. The bureau's Denver engineering office will make network analyses for the study.

Both the Kennedy and Eisenhower budget requests are the same for the Southeastern, Southwestern Power Administrations and the Federal Power Commission. Southeastern's budget stays at $800,000 total; Southwestern's budget stays at $7,260,000 ($5 million continuing fund, $1,310,000 for operation and maintenance, $950,000 for construction); the FPC budget remains $8,793,000 with $1,239,000 for electric power regulation, $385,000 to study federal river basin projects, $17,000 for the International Joint Commission.

Bonneville Power Administration's budget was raised by $2,314,000 to a total of $30,370,000. All of the increase will go for construction, to build five new transmission lines.

The lines would cost $34,405,000 ultimately. These lines, their 1962 fiscal cost (ultimate cost in parentheses) are: (1) a single 345-kv line between Portland and The Dalles Dam, $380,000 ($13 million); (2) a single 345-kv line between Seattle and the Canadian border, $425,000 ($10 million); (3, 4) two 230-kv lines to Tillamook and to Reedsport on the Oregon coast, $654,000 ($8,240,000); (5) a single 115-kv line between Lebanon and Green Peter dam site, $1 million ($1,165,000).

The line between Portland and The Dalles would be used to increase capacity between the two points (present circuits are already heavily loaded) and this line could serve as a strong connection with Bonneville, if and when the California-Bonneville intertie is built. The Seattle-Canada line would connect with British Columbia Electric Ltd., and would be used also to wheel power to Canada as part of the proposed treaty agreement on Upper Columbia River development.

USBR would complete planning and start work on 11 new transmission lines—most of it part of the Upper Colorado storage project—if Congress approves the Kennedy budget. All this work would be done without increasing Reclamation's budget: "reprogramming" of funds would permit the work to be started, by cutting back other work.

Bureau lines proposed are: (1) a 230-kv line between Cottonwood and Tracy, Calif., to bring Trinity-generated power into the Central Valley system ($5 million); (2) an eight-mile, 115-kv line between Keswick and Toyon, Calif., to increase power deliveries to Shasta area ($290,000); (3) a 230-kv line from Yellowtail Dam to Dawson County, Mont., to intertie the eastern and western divisions of the Missouri River system ($950,000); an addition of $5,830,000 (on top of Eisenhower's $8,673,000) to complete planning and start construction on a number of lines in the Upper Colorado River project; (4) Gunnison-Curecanti-Montrose, Colo.; (5) Glen Canyon-Phoenix, Ariz.; (6) Vernal-Provo No. 1, Utah; (7) Craig-Sinclair, Colo.; (8) Glen Canyon-Sigurd-St. George, Utah; (9) Four Corners-Albuquerque, N. M.; (10) Curecanti-Midway, Colo.; (11) Curecanti-Rangely, Colo.

A speed-up in the work on the bureau's Curecanti project is in sight, as a result of Kennedy's addition of $672,000 (to Eisenhower's previous $5,850,000) to continue work on the project.

REA would receive $100 million more, in the Kennedy budget, than from Eisenhower. This addition would be split equally between telephone and electrification loans. As a result, REA electric loan funds would be increased $50 million for fiscal 1962—to $165 million—plus an additional $30 million, which Eisenhower had earmarked only as reserve for contingencies. Actual 1962 electrification loan funds available under the Kennedy budget, therefore, from all sources, would be $195 million.

The Corps of Engineers receives a $17 million boost over the Eisenhower budget, although none of this added money would go for power-related projects. Total corps budget now would stand at $948.7 million, and Kennedy increased the Tennessee Valley Authority's budget by $2 million, which, of course, doesn't include money from power revenues.

Expected to come later are supplemental funds to start work on Libby Dam, Mont., the California-Bonneville intertie and Fryingpan-Arkansas projects.

Alaska Project Studied

A preliminary new report on a huge Alaska power project has been submitted by the Department of Interior to interested state and federal offices for comment. The project is the $500 million, 580,000-kw Devil Canyon Dam on the Susitna River between Fairbanks and Anchorage. The project would provide 6-mill power at both cities. A benefit-cost ratio of 1.72-1 has been determined.

Previously, the department had recommended construction of the 48,000-kw, $40 million Crater-Long Lakes project near Juneau. This project has a 1.67-1 ratio.

The Corps of Engineers would receive $300,000 in the 1962 budget to continue planning on the huge $1 billion, 4,760,000-kw Rampart Dam on the Yukon River.

Senate Approves Treaty

The proposed U.S.-Canadian treaty, to develop the remaining water storage and power potential of the Columbia River, was given an overwhelming go-ahead by the U.S. Senate, and the treaty now requires only Canadian ratification to become effective. That "only" may be a major hurdle.

The senate, however, voted 90-1 in favor of the treaty, with Senator Wallace Bennett (R-Utah) dissenting. Bennett called the treaty "part of the all-out public power policy of the new administration" and he noted that coal interests in his state opposed the treaty.

President Kennedy has asked, and received, a $350,000 supplemental appropriation, for the end of the present fiscal year, to continue studies leading to construction of Libby Dam on the Kootenai River, Mont., if the treaty is signed.

Burns Creek Up Again

Legislation to authorize the federal Burns Creek project on the Snake River, Idaho, again has come up before hearings by both the senate and house interior subcommittees on reclamation.

The Interior Department, whose Bureau of Reclamation would build the controversial project, claims it has found a better benefit-cost ratio: 1.33-1 (50 years) against the previous 1.19-1; or 1.65-1 (100 years) against the previous 1.4-1. The project still is figured at $45,430,000 in cost but higher power values provide the change, the department says.

Unlike previous years, the senate group may wait out the house group before it votes approval. Twice in previous years, the senate has approved the project, only to see the house committee kill the authorization bill. A $487,500 first-year appropriation was voted for Burns Creek a year ago, but can't be spent until the project is authorized.

Step-Up Ordered on Trinity Lines

Interior Secretary Stewart Udall ordered a stepped-up design and construction schedule for the Trinity-Central Valley transmission lines, using a $320,000 appropriation already granted by Congress to do the surveys and design work.

Udall also ordered the Bureau of Reclamation to hire outside consultants on the project, if needed. This authority apparently has been with the department all along, but it's little used.

The Trinity lines – all 230 kv – would be built for conversion to 500 kv between Tracy and Keswick, Calif., so that they could form part of the proposed Bonneville-California intertie, Udall added. The lines would be built as "common carriers," to be used by all systems.

NUCLEAR NEWS

Steam Generators for Hanford

Combustion Engineering Inc. has announced the shipment of the first of 10 steam generators for the AEC's new plutonium production reactor at Richland, Wash. Supplied under a $4.3 million contract, these generators will produce steam with heat from the cooling water issuing from this new reactor.

Each of the steam generators is 10 ft in diameter, 57 ft long, with a shipping weight of nearly 170 tons, and contains about 20 miles of stainless steel tubing. The generators are cylindrical pressure vessels, which contain both the steam generating surfaces and steam separating equipment.

The steam produced by these generators could serve an electric generating facility with a capacity of 700,000 kw. Recent public statements indicate that the present administration has decided to complete this installation as a dual-purpose plant. However, construction necessary to make electricity as well as plutonium available from this facility is subject to congressional approval. If this approval is obtained, the installation would be the largest nuclear power plant in the world.

Estimated Plant Capacity

On March 23, at the American Power Conference, Titus G. LeClair, manager of nuclear power application for General Atomic Division of General Dynamics Corp., summarized the results of a recent survey on the economic prospects of nuclear power.

The results of this survey reflected a belief that over the next 10 years the cost of fossil fuels will go up 12.9%, while the cost of nuclear fuel will drop 9.4%. During the same 10-year period, these industry leaders predicted increased efficiency for both fossil-fueled plants and nuclear plants, but with a greater efficiency gain for nuclear systems.

As for the over-all prospects for nuclear power, the survey results indicated that of all the additions made to the nation's power generating capacity in the year 1965, about 4% will be nuclear. In 1970, nuclear plants may account for 10% of that year's new capacity and in 1980 25%.

Based on the utility industry's average annual load growth, these estimates could mean a total of 1,-

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400,000 kw of installed nuclear power capacity in 1965, perhaps 5,000,000 kw in 1970 and 45,000,000 kw in 1980.

Future Boiling Water Reactor Costs

Large-scale boiling water nuclear power plants can now be built to compete with fossil-fueled power stations in some areas of the country, a General Electric spokesman reported to the American Power Conference on March 23.

Dr. R. B. Richards, engineering manager of the company's Atomic Power Equipment Department, reported the following cost figures for various size dual-cycle boiling water reactor plants that can be committed and built using today's technology for startup in 1965.

	300,000 Kw Size	400,000 Kw Size	500,000 Kw Size
Construction Cost ($ per kw)	197	183	175
Total Power Cost (mills per kwh)			
Initial Core	7.00	6.76	6.56
Future Cores	6.70	6.46	6.00

Dr. Richards went on to forecast 5.5 mill per kwh power costs from a 500,000-kw boiling water reactor incorporating nuclear superheat that could be committed in 1965 for operation in 1969.

He based these figures on an estimated reduction to $165 per kw in plant construction and capital costs, and an expected decrease in the current price of enriched uranium fuel and cost reductions for fuel fabrication and chemical reprocessing of spent fuel.

Uranium Concentrate Purchases

The Atomic Energy Commission purchased 35,273,000 lb of uranium concentrate at a cost of $304,717,000 from 25 ore processing mills in the western United States in calendar year 1960, according to the Grand Junction Operations Office. The above values give an average cost of this uranium concentrate of $8.64 per pound.

A state-by-state breakdown of the 1960 concentrate purchases follows:

STATE	NO. OF MILLS	LB. U_3O_8	COST
Colorado	7	6,234,000	$ 61,257,000
New Mexico	6	15,519,000	125,146,000
Utah	3	6,067,000	54,641,000
Wyoming	5	5,540,000	44,799,000
Others (Arizona, Washington, South Dakota, Oregon)	4	1,913,000	18,874,000
Totals	25	35,273,000	$304,717,000

COMMUNICATIONS

Short Hops at 12 Kmc

The operational fixed Microwave Council Meeting, which was held in Washington, D. C., last month, classified a point that was mentioned awhile back in this column. An FCC representative explained that backbone system using frequencies in the 6,700-mc band or lower would be acceptable but that "spurs" from the backbone less than 15 miles in length would be assigned only at 12 kmc for routine processing. This applies both to rural and urban areas.

So better comply with the above if you don't want an application returned or, if you have a very good reason for using the lower frequencies on a short hop, send plenty of explanation with the application. It was also indicated that formal rule-making incorporating these regulations would be forthcoming.

Satellite communications problems were also enlarged on by another member of the FCC staff, who indicated that it would be necessary for all classes of users to share microwave frequencies if these communications require several thousand mc of space. Looks like we'll get singed on this at least.

Transistorized Microwave

Transistorized microwave relay equipment will make its debut this year. This long awaited development has been announced recently by both Motorola and General Electric, with equipment delivery scheduled to some three electric utilities in the West by Motorola early this summer.

The Motorola gear uses only one tube, a 1-w kylstron, in the output with all other circuitry transistorized. The most astonishing feature, however, is a .0005% frequency tolerance, which is standard with the equipment.

G-E uses two kylstrons, one being in the output circuit, which also is rated at one watt, and the other in the receiver. The rest of the circuitry is transistorized. The frequency stability complies with existing requirements, but an extra option is offered to bring it up to .0005%. G-E also has announced a traveling wave tube relay station that is perhaps the first offering of such a device to the Power Radio Service users.

Both manufacturers earlier announced transistorized multiplex

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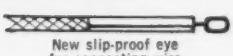

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which, along with the RF gear, can be operated either directly from battery or from a-c power. As you may recall, there was an awful yell from both manufacturers and users a year or so ago when the FCC proposed a .0005% frequency tolerance. Now it's being built into the equipment. The FCC will no doubt incorporate this into the rules now and give us so many years to modify the older equipment to comply or replace it. Somewhere around 1966 should be a good year for the manufacturers — but hard on your communications budget.

Radio Interference

Radio interference, so severe as to render operation of the station impractical, has been experienced recently by Washington Water Power Co. at one of its radio stations close to the Canadian border. It has been caused by the start up of a Canadian station on the same frequency and close enough to blanket the area.

These situations fortunately are not frequent. But they are hard on our electric utility operations since it is usually their stations that must cease operation pending formal negotiations between the FCC and the Canadian Transport Agency who handles frequency assignments north of the border.

Such instances will occur more frequently in the future as radio usage grows. Consequently, it would be most appropriate for the two countries to work out a more effective method of coordinating border station assignments. One way to do this would be to arrange for direct communications between the Department of Transport and the frequency coordinator affected, on an informal basis only, of course.

► Seems there is little that can be done in an electric utility anymore without involving communications. Wally Blankmeyer of Montana Power Co. **advises communications engineers to keep abreast of the other phases of their companies' planning and engineering.** As an example, he mentions that automation of one of his company's power plants resulted in the loss of operators who had the minor duty of attending a small telephone switchboard. Some five carrier channels costing something more than peanuts were needed to take care of it. However, it got into the planning early and was painless compared to its being sprung at the last minute after management thought it knew how much the project was going to cost.

PEOPLE

► **Max R. Llewellyn,** manager of Arizona Public Service Co.'s electric and gas operations, has been made a vice president of the company. A native of Salt Lake City, he received his degree in electrical engineering from the University of Utah and joined the company's predecessor, Arizona Edison, in 1947 as general superintendent of operating and engineering. Previously he had been engineer for the Burbank municipal utility in California.

Llewellyn

► **Lowell Painter** has been appointed Anaconda manager for Montana Power Co., succeeding **James T. Manion,** retired. Manion, who joined Montana Power as an office boy in 1916, had headed Anaconda operations since 1941. Painter, a 27-year member of the organization, has been assistant superintendent of the Billings office.

► **William O. Munson,** who recently completed two years of research on high-energy fuels for the Army's rocket and missile agency, has joined Pacific Power & Light Co.'s research department as an assistant chemical engineer. According to Dr. James B. Ward, director of research for PP&L, Munson and **F. W. Braun,** who joined the company in 1959, have responsibility for a number of natural resource and development projects that the company has initiated in its service area.

Munson

► **C. Dudley Pratt Jr.,** who has been Hawaiian Electric Co.'s safety director, has been appointed manager of its distribution department. **Robert Cooper** has taken over as safety director.

► **Norman Berg,** formerly with Salem Electric, is now chief engineer for Tillamook County PUD, succeeding **Jack Madison.** Madison moved up to superintendent of operations and maintenance. **Jeri Overs** took Berg's duties at Salem Electric.

Here are the Graybar Offices in the West

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Los Angeles:	210 Anderson St. ANgelus 3-7282
Oakland:	1911 Union St. GLencourt 1-5451
Oceanside:	805 N. Tremont St. SAratoga 2-2141
Sacramento:	1900 - 14th St. HIckory 4-8830
San Bernardino:	655 South "H" St. TUrner 9-1051
San Diego:	720 State St. BEImont 3-1361
San Jose:	1376 N. Tenth St. CYpress 2-9090
San Francisco:	1750 Alameda St. MArket 1-5131
Santa Ana:	301 French St. KImberley 3-8309
Santa Barbara:	329 S. Salinas St. WOodland 5-1013
Van Nuys:	15520 Cabrito Road STate 2-9600

COLORADO

Colorado Springs:	630 West Vermiio Ave. MElrose 4-3701
Denver:	104 Wazee Market TAbor 5-7111

IDAHO

Boise:	1325 Idaho St. BOise 3-2594

MONTANA

Butte:	604 E. Aluminum St. BUtte 3233

OREGON

Eugene:	2380 West Broadway DIamond 4-2224
Portland:	N.E. 60th and Banfield ATlantic 8-5661

UTAH

Salt Lake City:	336 North Third West St. ELgin 9-8771

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You can save money on bookkeeping time with Graybar as your auxiliary warehouse

At least half of stores' transactions cover items costing under a dollar. So it's easy to see how total bookkeeping time can be topheavy.

However, when you make Graybar your auxiliary warehouse for electrical equipment and supplies, you open possibilities for savings. An increase in the number of items on the Graybar order, can save you time in writing orders and in processing them. So can the blanket order for a specified period. Other measures save at inventory and auditing time.

Start with a local call . . . Let the Graybar man come in, study your system, and submit recommendations. You'll find it worthwhile.

Employee-owned Graybar, a part of your local community, has served utilities continuously since the first lines went up. Whether you require 3 items or 3,000, Graybar is your most practical source for most electrical utility equipment and supplies.

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- Reduce inventory investment
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- Step up manhour efficiency
- Simplify bookkeeping

933

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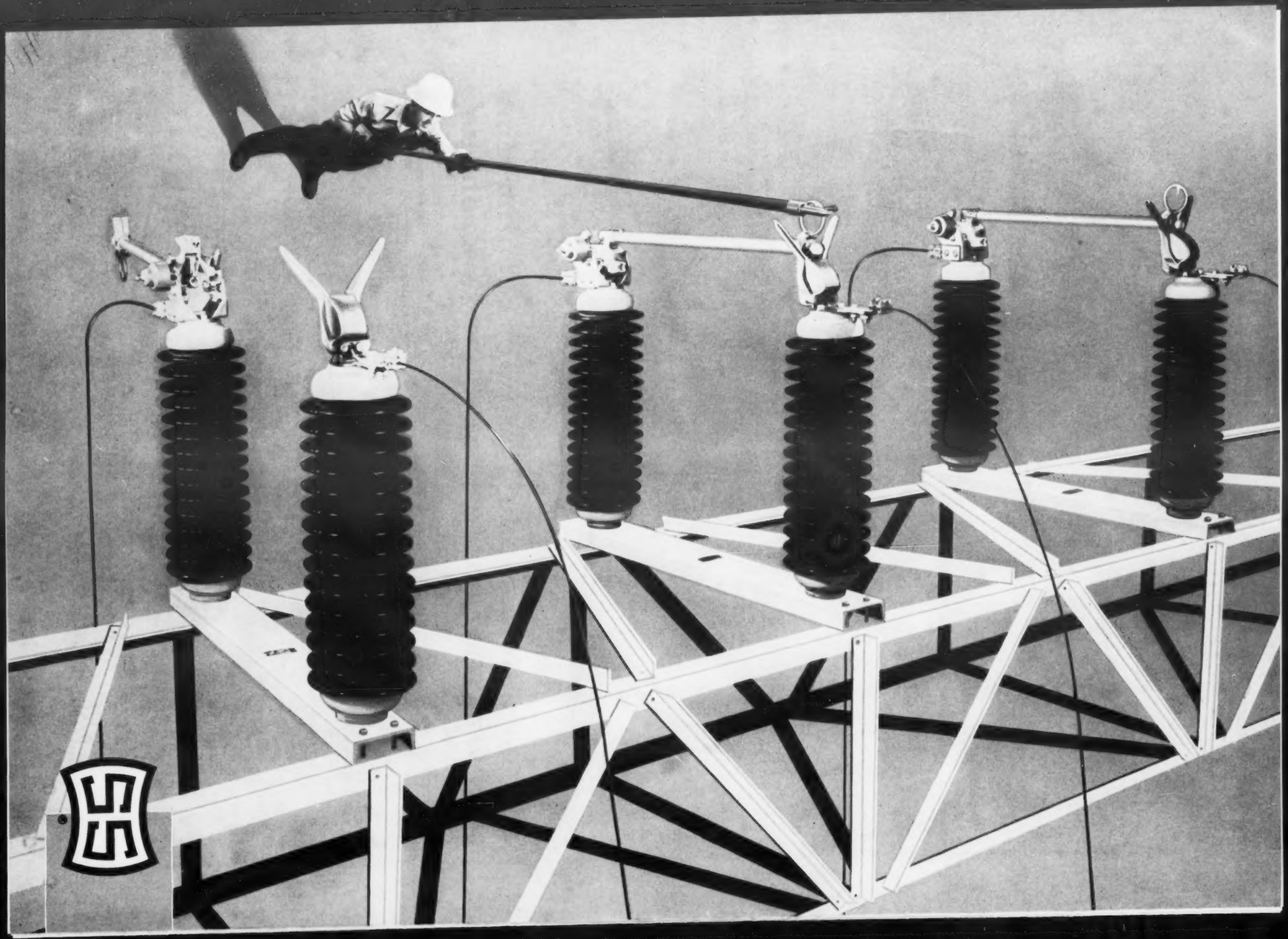
'GraybaR Everything Electrical 'GraybaR

IN OVER 130 PRINCIPAL CITIES

LOCAL SERVICE TO UTILITIES THROUGH COAST-TO-COAST WAREHOUSING



DON'T OVERLOOK THE MECHANICAL CHARACTERISTICS WHEN EVALUATING YOUR POWER FUSES

Thermal and electrical characteristics rightfully deserve first consideration in evaluating power fuses, because the fuse must carry rated continuous current and interrupt rated short circuit currents to perform its primary function.

But from an operating and maintenance standpoint, the fuse's mechanical characteristics should not be overlooked. Here are nine of the most important features to consider:

1. **OPERATING RING** Can the fuse holder be easily disengaged from the latch? It is important that the operator have complete control over the fuse holder during the opening procedure. Southern States BPA and HPA fuses have full-circle operating rings to assure complete control.

2. **FUSE HOLDER REMOVAL** Can removal or replacement of the fuse holder be accomplished easily and simply? Special, cumbersome, rigs are objectionable to operating personnel. Southern States fuse holders are handled with a hookstick.

3. **SLEET HOOD** Are the top contacts fully protected from freezing rain, snow, or other foreign matter? Note the extra large hood on Southern States fuses.

4. **POSITIVE HOLDER GUIDE** Will the fuse holder make proper engagement with the top contact, even when closing is made from an oblique angle? Southern States fuses are equipped with generous guide arms on the sleet hood to position the holder properly, regardless of side thrust.

5. **POSITIVE IDENTIFICATION** After operation, does the position of the fuse clearly indicate that an operation has taken place? Southern States fuse holders swing to a fully open position and can be easily spotted from a distance.

6. **SHOCK ABSORPTION** After operation, does the fuse provide a sure means for bringing the fuse holder to a cushioned stop? Damage to the fuse mounting is prevented on Southern States fuses by properly designed snubbers.

7. **LINK PROTECTION** When the fuse holder is slammed closed, is there some means to prevent overstressing the link? To avoid the possibility of rupturing a link, mechanical locks on the BPA and HPA fuses absorb force transmitted through the bottom hinge assembly.

8. **RESTORING SERVICE** Is the fuse easily and economically restored to service after operating? Fuses that require elaborate replacement components to keep them in service are not only costly, but burdensome to both supply and operating personnel. A simple, inexpensive fuse kit is all that's needed to restore service with Southern States power fuses.

9. **SELF-LOCKING HINGE** When the fuse operates, are the fuse holder and fuse mounting locked together? For safety reasons and to avoid possible damage to nearby equipment, Southern States fuses are equipped with self-locking hinges.

Before you buy your next power fuses make certain they measure up in every respect. Southern States BPA and HPA Power Fuses will.

For complete details, consult your Southern States representative, or write direct to us.

SOUTHERN STATES

HAMPTON, GEORGIA

IN CANADA: DOMINION CUTOUT CO., LTD., TORONTO

STOP TRANSFORMER FREEZE-UPS

Eliminate costly transformer corrosion and freeze-ups with a Horkey-Moore Porta De-Con unit. This compact, portable equipment decontaminates liquid petroleum products by removing particulate contaminants, water and air. Returns oil actually cleaner than new. Removes all free water plus all dissolved water down to 20 parts per million (80°F.), therefore requires far less frequent servicing. Increases dielectric strength beyond 35KV. Simple, automatic operation. Saves time, saves labor, saves equipment, saves cost of transporting and replacing oil. Reasonably priced. Send today for brochure.

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ELECTRICAL ENGINEERS:

Constant innovations in already complicated construction make Estimating a distinct and exacting profession, requiring constant research. There can be substantial difference in cost between two apparently similar projects.

Thus, more and more owners, architects and engineers are using our estimating service. It includes:

1. Preliminary estimates to keep building costs within budgetary limits.
2. Comparative costs of alternative designs, materials, equipment, systems, schemes, etc. as an aid in selecting the materials, etc. most suited to each project.
3. Final cost estimates, the quantities of which may be furnished as an aid to bidders or as a basis of fair competition.
4. Cost estimates of desired changes during construction.
5. Checking of contractor's estimates of work in support of partial payments.
6. Construction cost counselors from beginning of preliminary plans to final completion of project.

Ask us for complete details of our estimating service for Electrical Engineers.

LeRoy Construction Services

768 Brannan Street **San Francisco 3**

UN 1-2483

► **Frederick B. Holoboff,** recently appointed to a six-year term on the California Public Utilities Commission, is the youngest member ever to serve with that group and the first from San Diego. As chief deputy city attorney, Holoboff represented the city of San Diego for 4½ years at PUC rate hearings. Almost invariably his position was to speak during the hearings against proposed rate increases. In a recent interview he said he saw it as "an obligation of the commission to see that a utility does not operate at a loss and that it can show a profit for its stockholders so they will remain interested in investing." He added that the consumer's best interest is to see that a utility makes money but that it is necessary for the PUC to be receptive to legitimate interests of utility consumers.

► **Joseph Gray,** chief inspector, Portland, Ore., who has returned to the job after a severe illness, plans to continue until retirement on June 30. He was president of the Northwestern Section, IAEI, last year.

► **Frank Upright** has taken over the work of the late Lou Gawan, consulting electrical engineer, in the Salt Lake area. He is carrying through projects which the organization had under way at the time of Mr. Gawan's death. Offices are in the Beneficial Life Building.

► **C. Oscar Drake,** district sales manager, Electrical Products Co., Salt Lake City, was elected president of the Salt Lake Safety Council at its recent annual meeting.

► **John J. Carson,** vice president of B. C. Electric Co., has been chosen by the Federal Commission on Government Organization to head a study on manpower management in public service. Carson will recruit a team from industry, labor and government to work with him.

► **John M. Nelson,** executive assistant director of Seattle City Light, was named Engineer of the Year by the Washington Society of Professional Engineers. He was honored for his work as an electrical engineer and for his community activities.

► **G. L. Haszard,** general purchasing agent of B. C. Electric, has been elected president of the **Electrical Service League** of B. C. at Vancouver. Other officers are: Dr. H. L. Purdy, B. C. Electric president, and Dr. H. L. Keenleyside, B. C. Power

Commission chairman, honorary presidents; W. C. Mainwaring, R. G. Anderson and R. C. McMordie, honorary vice presidents; C. W. Nash, vice president; J. E. Milburn, honorary secretary; John Nairn, treasurer; and J. R. Dooley, secretary-manager.

► All three officers of the Washington Public Power Supply System have been re-elected, with **Grover C. Greimes** of Clallam County PUD as president, **Glenn C. Walkley** of Franklin County as vice president and **William T. Elmgren** of Clark County as secretary. Greimes has been president since the unit was organized in 1957 to study joint construction of generating facilities by 16 PUDs.

► **Norman M. Scofield** has been made manager of line construction for Pacific Gas and Electric Co., succeeding **Harold D. Wright,** who has retired after 41 years of service. A native San Franciscan, Scofield joined PG and E in 1921 while still a student at Stanford University. He returned to the company in 1923 after his graduation.

► President **Robert T. Person** of Public Service Co. of Colorado was installed May 17 as president of the Denver Chamber of Commerce.

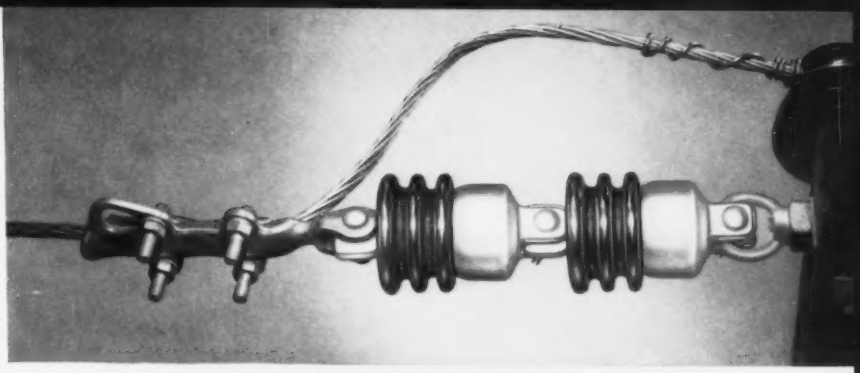
► **Lawrence Karrer,** Puget Sound Power & Light Co. vice president, will be vice president, operations and services, for Century 21 Exposition at Seattle.

► **Jack D. Stevens,** who has served as consulting engineer for the Puget Sound Utilities Council since its inception seven years ago, resigned March 31. Other engineering commitments made it impossible for him to continue, he said.

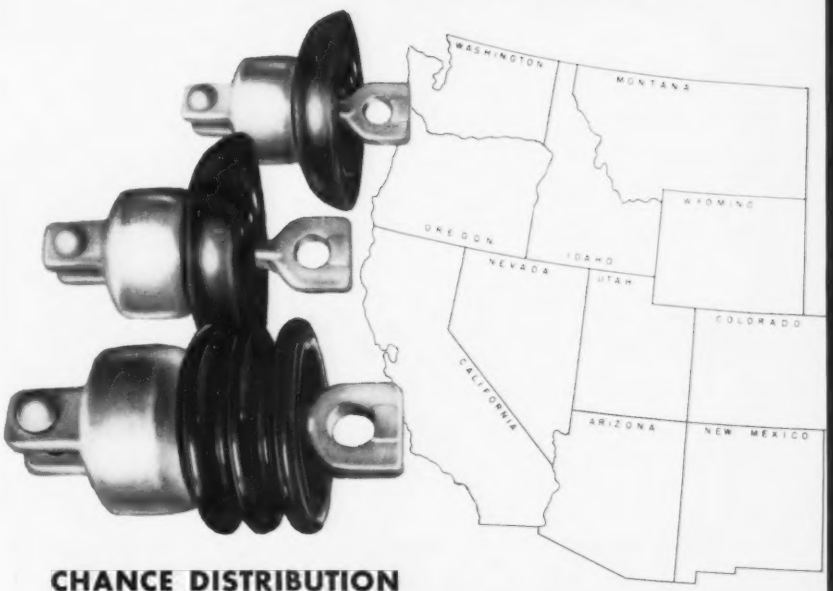
► **Frank R. Porath** has been appointed to the newly created post of analytical and computer engineer for San Diego Gas & Electric Co. **John H. Woy,** who has been rate department supervisor, takes over Porath's former post of rate engineer.

Deaths

► **William O. Kyte,** 49, advertising and sales promotion manager for General Electric's Apparatus Sales Division, Pacific Southwest District, died last month following a long illness. Joining G-E's test engineering program in 1934, he was a lecturer at the research laboratory in Schenectady during 1935 and '36 and



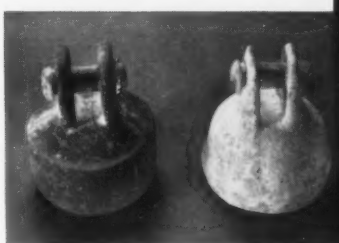
NEW PRODUCTS TO SERVE THE FAST GROWING WEST



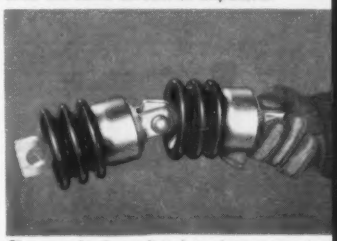
CHANCE DISTRIBUTION DEADEND INSULATORS WITH CORROSION-RESISTANT ALUMINUM FITTINGS

Here's the new look in distribution deadend insulators . . . Chance Insulators with aluminum caps and studs. The first insulators with corrosion-resistant all-aluminum hardware that makes them as much as 30% lighter than standard insulators and ideal for all types of distribution deadend installations. Because they are lighter, they're easier to install. And, because the aluminum hardware is highly resistant to corrosion, they have a longer service life.

The new 4½ inch SLIM-LITE design (foreground) has a higher mechanical impact rating and a puncture voltage rating 35% higher than standard 6 inch discs. Its slim contour improves appearance of lines and makes it easier to cover with protective equipment.



500 hour salt fog tests had little effect on aluminum cap (left), while ferrous cap (right) is badly corroded and damaged after the same amount of exposure.



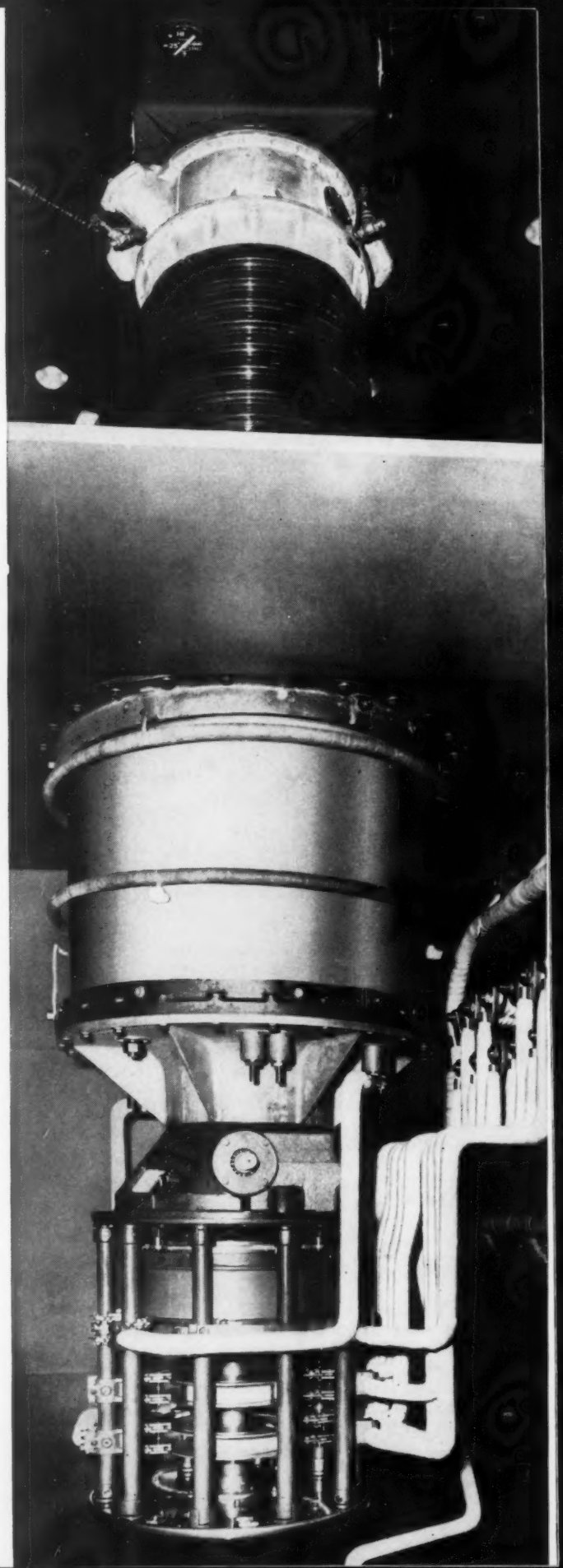
Chance aluminum fitted insulators can be handled easily without breaking because the square tongue keeps porcelain apart.

ABC INDUSTRIES

A. B. CHANCE COMPANY
CENTRALIA, MISSOURI
(A. B. Chance Company of Canada, Ltd., Toronto)

C160-27

new URH high-voltage load tap changer on 200 mva transformer reduces weight 10%, length 25%, losses 15%



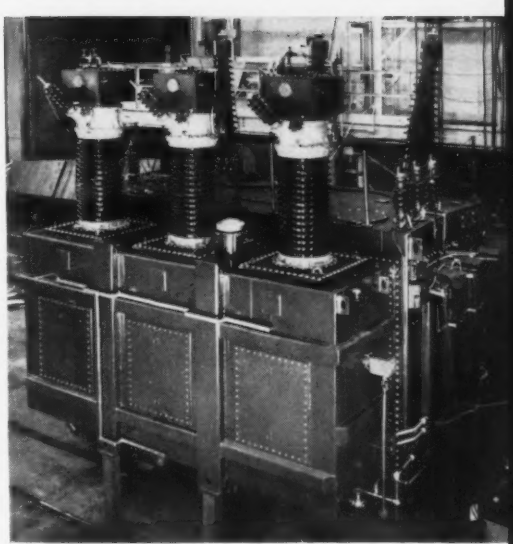
Here is how to reduce shipping weight and size, and improve efficiency, in high-voltage power transformers.

The new Westinghouse URH High-Voltage Load Tap Changer is designed for line voltage operation; eliminates the need for a series transformer. It also eliminates the preventive auto-transformer. Instead, a transition resistor is used, keeping current and voltage in phase for better arc interrupting conditions.

Its in-phase resistance-type transfer switching contributes to extra long contact life.

It's always on position, no matter where it stops in a tap change cycle.

With the new Westinghouse URH High-Voltage Load Tap Changer, the 200 mva transformer shown here has been reduced in weight, size and losses as compared with units utilizing conventional high-voltage load tap changing equipment. You can make similar savings on other sizes of Westinghouse power transformers. Ask your Westinghouse representative for details; or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pennsylvania.



This 200 mva Westinghouse transformer is the largest in the U.S. with resistance-switched high-voltage load tap changer. Shown on test, it is now installed at the Gardenville, N.Y., station of the New York State Electric and Gas Corporation to step down voltage from 230 to 120 kv. J-70955

YOU CAN BE SURE . . . IF IT'S **Westinghouse**

For phone number of closest representative see advertising index in back of book.

later was in the Motor Division there. He was transferred to Los Angeles in 1938 as a sales and application engineer in the apparatus department. He joined the U. S. Army Signal Corps in 1942 and participated in six campaigns in the European Theater of Operations, going in 1945 to Wright Field as radar design and development officer.

► **R. G. Kenyon,** affectionately known as "Spike" by the electrical industry and newspaper field even into his vice presidency of Southern California Edison Co., which he achieved in 1945, passed away April 13 in San Marino, Calif. He had retired in 1958 after a career starting as securities salesman, employment agent, then advertising manager and later assistant vice president (1942) in charge of employment. A witty and penetrating speaker, he often addressed newspaper and public audiences as well as those in the industry. He was Electric Club of Los Angeles president and a director of PCEA prior to retirement. In his 41 years with Edison he was an executive officer for 16 and always an articulate spokesman for it.

► **Albert Givan,** 84, chief engineer and general manager of the Sacramento Municipal Utility District when it was organized in 1923 and associated with the utility until 1947, died in Sacramento April 1. He was first secretary of the state board of registration for civil and professional engineers and was one of those responsible for legislative action creating the board. The Engineering Council of Sacramento honored him last year for outstanding service to the community and to his profession.

► **Ernest Leon Dee,** 75, died of a heart attack on March 17 in Salt Lake City. He retired in 1950 after managing the G-E Lamp Department in the intermountain area for 35 years. He was a native of Ogden.

► **Scott D. Higley,** owner of Scott Electric Co. in Reno, died following a heart attack. Before starting his own business three years ago, Mr. Higley was associated with Saviers Electrical Products Corp. parts department and with the Electrical Service Co. in construction.

► **Charles C. Bintz,** age 71, chairman of the board of the W. H. Bintz Co., for many years Frigidaire distributor in the Intermountain area, Salt Lake City, died while visiting Huasca, Mexico, early in March.

MARKET DEVELOPMENT

Residential Program Wins EEI Award

Pacific Gas and Electric Co. won the Edison Electric Institute's residential sales promotion award in its classification for 1960.

Commenting on the honor, Vice President O. R. Doerr said it recognized not only the company's efforts but also the energy displayed by electric dealers, wholesalers, manufacturers and contractors who cooperated in a year-long residential sales campaign.

While appliance sales generally showed a decline in 1960 as compared with 1959, there were percentage gains in nearly all categories in the PG and E territory. Average use of electricity by domestic customers in northern and central California increased 297 kwh, best annual gain in the company's history.

A. M. Wade, chairman of the EEI awards committee, presents the winning plaque to Marguerite Fenner, director of PG and E's home economics department, who accepted it for her company

Electric Use Up

More than 90 of every 100 Seattle housing units are equipped with electric refrigerators, ranges and vacuum cleaners, according to the Seattle *Times'* 1961 consumer survey of the Greater Seattle area.

In the case of the refrigerator, the saturation point almost has been reached. (The survey showed a 99.4% refrigerator use.) Electric ranges are not far behind (at 92.4%) with vacuum cleaners next (at 91.5%).

Fully automatic electric washers are used by 68.9%, dryers by 51%, food freezers by 29.6%, garbage disposers by 11.2%, and electric heaters by 8.3%. All these percentages have shown gains in the past year.

Television sets are almost as numerous as refrigerators, the survey shows. They are owned by 95.2% of all Greater Seattle families, with 19.3% owning more than one set. Nearly 44,000 families bought sets last year.

In smaller appliances, men's use of electric shavers dropped from 60.4% to 59.1% but feminine use advanced from 30.3 to 34.5%, with 70% of the women owning their own shavers.

► **El Paso Electric** Co. gets out a handy booklet to go with an employees' prospect plan. Advantages of electric cookery, electric water heating, facts about quick recovery electric water heaters and similar talking points for clothes dryers and freezers are given. Other pages tell how to read a meter, average kilowatt-hour consumption of electric appliances and give wiring and plumbing regulations. The handy pocket size booklet also contains prospect cards and a record for the individual employee.

► A canister and upright-type vacuum cleaner **with a magnetized Touch 'n Lock cover** has been introduced by Sunbeam for the medium price range. The new cover is designed for easy dirt removal.

HONORED—Arthur J. Cafarchia of Westinghouse Electric Supply receives his award as portable appliance salesman of the year, in an activity sponsored by the Electric League of Southern California. Congratulating him is C. M. Conrey, Los Angeles district specialties sales manager for Wesco. The award was made on recommendation of dealer members of the league, and was presented at a dinner at the Statler-Hilton

► **Hawaiian Electric Co. installed its 100,000th residential meter** recently in the all-electric home of Mr. and Mrs. Andrew Kaaekuahiwi Jr. To mark the occasion, President Ralph B. Johnson presented the housenolders with a TV-phonograph combination with gift records presented by Sears. Erma Boyen, home service director, contributed a luau platter with a cooked suckling pig prepared by Chef Fred Miyake of the Royal Hawaiian Hotel. Heco's first meter was installed in 1906.

Dealers May Use Reddy

PG and E *Reddy Dealer News* is the new name for the dealer bulletin published by the company's sales department for the various divisions. Under a new Reddy recommended dealer plan, qualifying dealers may borrow PG and E's trademark and use him in appliance promotion and advertising. The company's own advertising will introduce the emblem as the new sign of reliable appliance dealers.

A Reddy prize drawing is being sponsored in May by Northern California Electric Bureau and the Gas Appliance Society to increase public recognition of dealers who display the emblem. Prizes to create store traffic include expense-paid vacations for two around South America and to Hawaii, in addition to $15,000 in appliance gifts. To publicize the drawing, PG and E boosted its newspaper advertising 50%, mailed out more than 2,000,000 bill inserts, and made available Reddy lapel pins for customers who deposit entry blanks with dealers.

As dealer-salesmen incentives, the two top salesmen of major appliances during the contest period will receive a 10-day expense vacation in Hawaii. Salesmen also may compete for cash prizes in local areas.

► **A massive electric dryer sales promotion** was sponsored by the Electric League of Southern California. Southern California Edison Co., one of the principal participants, offered free electric blankets to people who purchased electric dryers or combination washer-dryers from participating appliance dealers within its service area.

CONVENTION ISSUE

The June Convention Issue will report on NELPA, PCEA and RMEL meetings held in April along with May association meetings.

ASSOCIATION AFFAIRS

Kickoff luncheon for industry show had Jack Singleton, EMEA president, K. B. Rymer, show chairman, and speaker O. R. Doerr, PG and E, S. F. Chamber of Commerce president

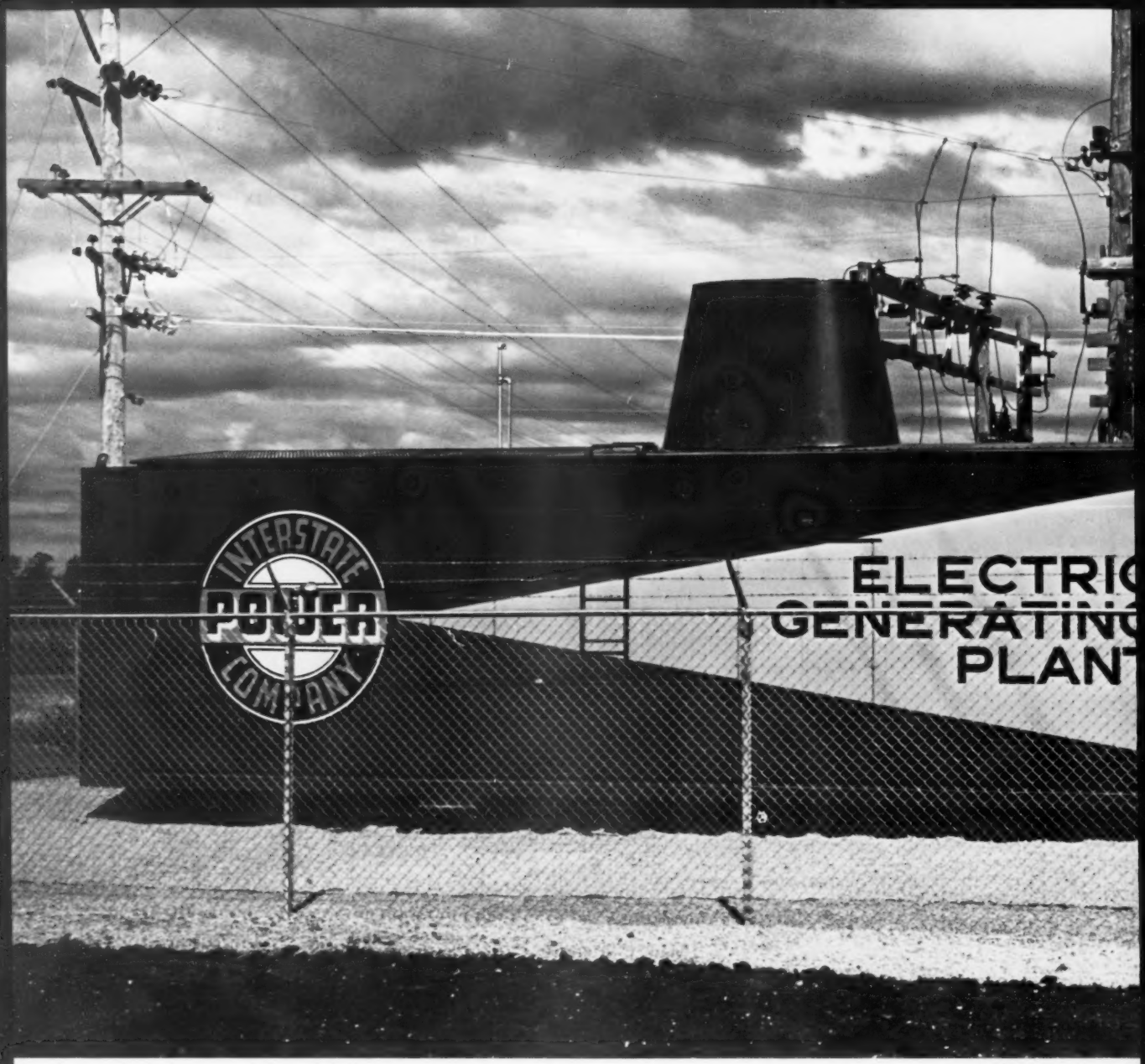
Industry Show

Electrical Industry Show and Conference of Northern California, the first in many years, sponsored by the Electrical Maintenance Engineers Association of Northern California, surmounted the many obstacles placed in its path and came out a hard-won success, April 6-9, in Brooks Hall, San Francisco. It was a good show of industrial and commercial electrical equipment exhibited by some 60 manufacturers and distributors, a lighting maintenance contractor and an industrial electrical contracting firm. From the 25,000 invitations sent out throughout the northern part of California, southern Oregon and Nevada to engineers, plant managements and maintenance men, architects, contractors and others, some 3,000 visited the show, were interested, and many of them attended the lectures held each afternoon.

O. R. Doerr, vice president of sales, Pacific Gas and Electric Co., and president of San Francisco Chamber of Commerce, addressed a kickoff luncheon, April 6, at the Sheraton-Palace, outlining the industrial and commercial growth potentials of the region and its growing needs for power and qualified people to install and maintain it. The meeting was chairmanned by K. B. Rymer, manager, General Electric service shop, show co-chairman with D. J. Miller, PG and E superintendent of shops. Jack J. Singleton, president of the EMEA, superintendent of the electrical department, Pacific States Steel, welcomed the visitors to the luncheon and show.

Electrical contractors and union, who had originally opposed the show, then decided to enter it with a large exhibit to demonstrate their superior merits for performance of plant construction and maintenance, "struck" and withdrew at the last moment. As a result, some independent contractors, who exhibited, derived all the benefit of contact with the managements of plants and buildings and maintenance executives who attended. Contractors and union were to have financed their exhibits with the industry fund they derive from a 5¢-an-hour tax on all labor charged the public for public relations and business promotion.

Further to provide contractors a forum in which to tell their story was a round table discussion session set up on Sunday afternoon. The subject, "External contractor or internal maintenance: cooperation or conflict," was moderated by R. B. Marxheimer, engineering professor at San Francisco State College. On the panel were J. J. Singleton of Pacific States Steel; Larry Creech, Lease-Lite Corp., maintenance contractor, San Francisco; Elmer Lago, Lago-Himes Electric, Oakland; Milton Laursen, Smith-Corona-Marchant Inc., past president of American Institute of Plant



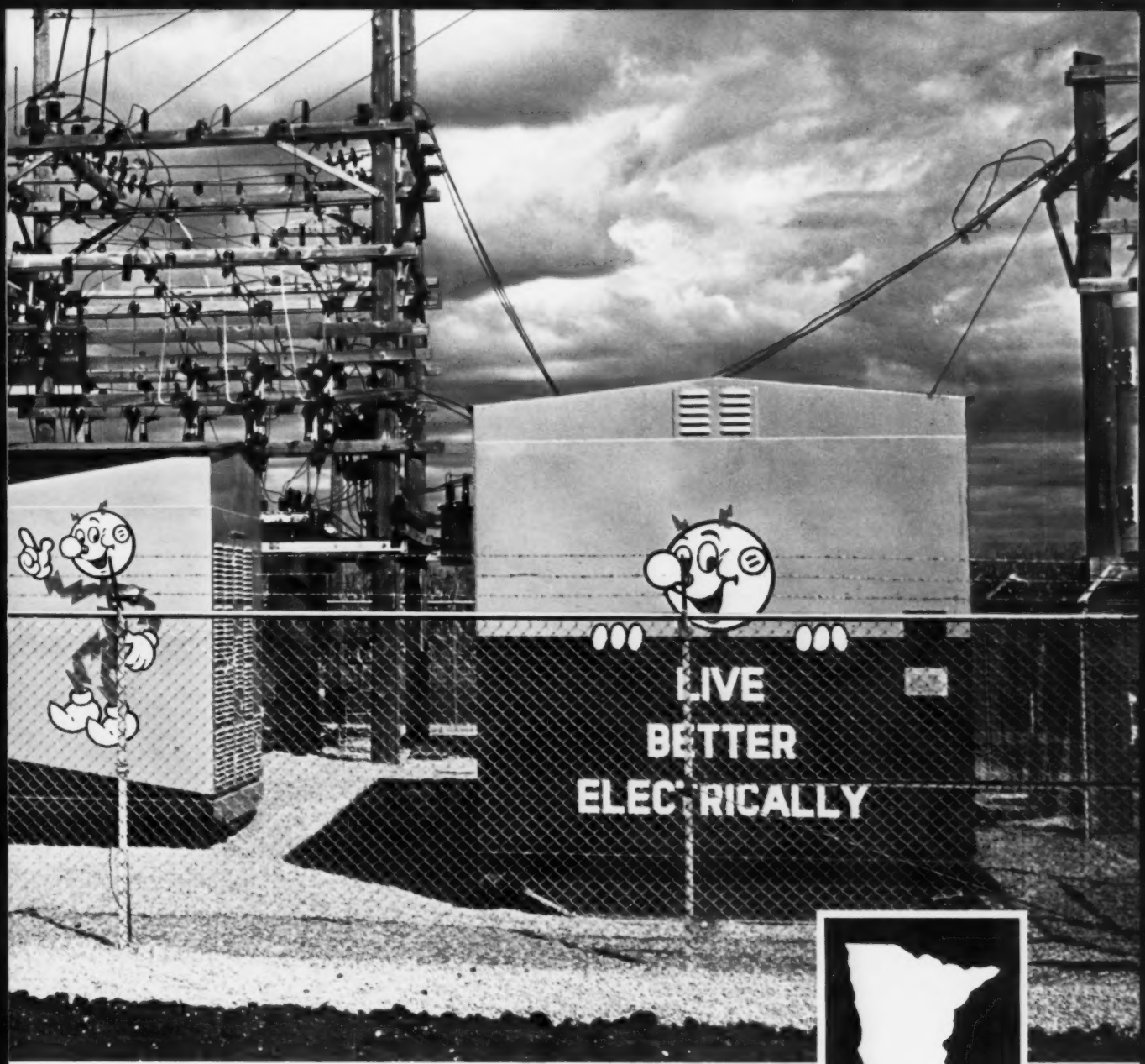
Interstate Power Insures Service with

Interstate Power Company has installed a 2000 KW Electro-Motive Diesel Plant at Hills, Minnesota, to provide peaking power and area protection to Hills and five other communities in the western end of the system.

The installation of Diesel Peaking Power made it possible for Interstate Power to economize because it eliminated the need for a more costly second transmission line. And the automatic deadload pick-up feature of the Electro-Motive equipment also makes it possible to protect the area against emergency line outages. Designed for automatic control, the new 2000 KW Plant synchronizes and goes on the line in less than two minutes. On several occasions since its installation, when transmission line trouble occurred, the Electro-Motive Plant automatically picked up the area load and maintained it until the system returned to normal.

FLEXIBLE AND RELIABLE—The inherent design characteristics of the Electro-Motive Equipment at Hills, Minnesota, that make it ideal for peaking and area protection, also make these Plants ideal for many of your system requirements:

- fast start for spinning reserve
- automatic deadload pick-up for area protection



Electro-Motive Peaking Plant

- unattended operation for remote control peaking service
- portability for simple installation
- freedom from damage to components caused by rapid thermal changes occurring from start to full load

Available in units from 2000 KW to 10,000 KW, the Electro-Motive peaking equipment line contains both Diesel and dual-fuel plants that can permit matching the plant to exact requirements for the most economical and efficient operation at the lowest investment. Ask your Electro-Motive representative for complete details.

ELECTRO-MOTIVE DIVISION · GENERAL MOTORS

LA GRANGE, ILLINOIS

In Canada: General Motors Diesel Limited, London, Ontario

Engineers; and W. J. Barrett, business manager, Local 6, IBEW.

At the other conferences, speakers and subjects were: William D. Lee, G-E apparatus service shops marketing manager, on "Measuring the performance of the maintenance man for the job ahead." Mark Sheldon, manager of training, Ampex Instrumentation Products Co., "Magnetic tapes in automation." Z. Roy Stanley, safety engineer, California Division of Industrial Safety, "Cooperation between the state electrical safety engineer and the maintenance man." Ernest Nelson, San Leandro chief electrical inspector, "Understanding city electrical inspection requirements." W. U. Dent, electronic engineer, Westinghouse Electric Corp., "The coming role of electronics in the electrical industry."

Attendance records show that there were engineers and plant executives from as far away as Denver, Los Alamos, Oregon, Nevada and all parts of California.

Santa Rosans Light Up

Surprising response, more than hoped-for attendance and genuine public interest resulted from an enterprising gamble on a lighting show that the electrical industry in the North Bay region took, April 13-15 at the Flamingo Hotel in Santa Rosa, a relatively small city for such an undertaking. It was co-sponsored by the Electrical Industry Fund of Solano-Napa Counties, the Redwood Chapter of National Electrical Contractors Assn., Northern California Electrical Bureau, Pacific Gas and Electric Co., and all electrical distributors serving the region — Graybar, General Electric Supply, Westinghouse Electric Supply, Phillips & Edwards, Jobbers Electric, California Electric Supply, National Electric Supply and a new Evmar Supply Co.

Manufacturers of some 30 lines of lighting equipment for gardens, homes, offices, schools, industrial plants and streets exhibited in well displayed booths in two banquet halls of the hotel. Lectures on lighting for offices, new light sources and garden lighting were given both in the exhibit space and outdoors at the pool to audiences as large as 300 people. Total attendance at the exhibits far exceeded the 1,500 hoped for by the sponsors. Although the general public was invited by ads to the garden lighting talks and demonstrations, invitations to commercial, industrial and school people and to contractors, builders and architects circulated throughout the San Francisco Bay area brought visitors in large numbers.

Heading the sponsoring committee was Karl Stolting, electrical contractor and councilman of Santa Rosa; James Barnes, Pacific Gas and Electric Co., San Rafael; and Robert Coleman, NECA manager.

Maintenance Seminar

More ambitious than ever before, the seventh biennial conference staged by the Electrical Maintenance Engineers of California, at University of Southern California, March 28-30, was the most successful and best attended. Some 300 people from all phases of electrical maintenance, contracting, plant management and engineering attended the opening banquet, three luncheons, an exhibit of new electrical materials and devices, and a series of conferences and panel discussions. An especially strong program brought high praise from those who participated and benefited from these sessions each morning and afternoon.

That the "Changing Face of Maintenance" is being brought about by automatic, integrated operation of so many plants and requires a much better trained and informed maintenance personnel was the keynote of the banquet speaker, George E. Kinney of Hughes Aircraft Co. High production costs demand continuity for economy and downtime is prohibitive. Hence personnel and products makes preventive maintenance a necessity. Early diagnosis of trouble is far better than cure, he stressed.

Personnel and training, indeed, were big topics in each of the sessions on codes and inspection, electronic maintenance, management-maintenance climate, industrial maintenance and especially the liveliest session of all on "The Ticking Electrical Maintenance Man."

Typical of the talent on each of the panels was that on the code session, moderated by Sidney F. Hill, Hill Electric Co., contractor. G. A. Wintz, Los Angeles chief electrical inspector, Merle A. Plummer, Department of Water & Power; E. E. Carlton, California supervising electrical safety engineer; and Karl Geiges, vice president, Underwriters' Laboratories, were the panelists.

► **San Francisco Electrical Contractors Assn.** re-elected all of its officers for another year at its annual election meeting in January. This returns to office Emil J. Weber, president; Fred E. Wilder, vice president; Mike Roth, secretary; LeRoy Moser, treasurer; and directors John Bauer, James Darrow, John DiGregorio, William Langlais, who is likewise governor, Clarence Lindstrom and David Stadtner. The officers were honored at the annual dinner which climaxed the tri-district meeting of NECA April 29.

Some of the committee that made the Santa Rosa Lighting Show a shining light—seated: James Barnes, PG and E, and Karl Stolting, contractor, Santa Rosa; standing—Curtis Croco, Don Peterson and Mark Jensen, PG and E, and Robert Coleman, NECA manager

Northwest Public Power Group Meets at Wenatchee, Wash.

The proposed intertie transmission line between Pacific Northwest and California would become the first unit of a nation-wide power grid developed and maintained by the federal government, if hopes expressed at the annual meeting of the Northwest Public Power Assn. April 5-7 become reality.

Charles F. Luce, new BPA administrator, confined himself to the Northwest-California intertie, assuring the convention that no power would be exported from the region without both legislative and contractual agreement that the originating area would have priority to the power.

Kenneth Holum, assistant secretary for water and power in the Department of Interior, described the Pacific Coast intertie study as the first in a "program for interconnecting regions served by federal projects."

Alex Radin, general manager of the American Public Power Assn., was more specific. He looked forward to the day when a Pacific Rim intertie would link the power resources of Alaska, Canada, the Pacific Northwest and the Pacific Southwest.

Pat Greathouse, vice president of the United Auto Workers, had the grandest plan of all, proposing a nation-wide power grid.

"It doesn't make sense to have 3,000 separate power systems spread across the nation with no intertie," Greathouse told the opening session of the convention. "Our country would look pretty foolish in time of disaster if one portion of the nation were without electrical power because of the lack of a national tie-in."

The union official urged the public power agencies to take the lead in working for such a grid, assuring labor support. His listeners made no comment and a participant in a panel later that day on "Policy Issues Facing Consumer-Owned Power Systems in the Pacific Northwest" raised the question as to whether public utilities really wanted the new administration to re-assert leadership in all areas of resource development.

The convention expressed a keen interest in new generating facilities, as well as in intertie lines. The Hanford convertible reactor drew the most attention. It was the subject of a major address by W. E. Johnson, general manager for General Electric's Hanford atomic operation, and also was discussed by Luce.

Conversion of a Hanford reactor to produce an estimated 650,000 kw at about 4.5 mills is "economically feasible," Johnson told the convention. He admitted, however, that reactor economics are "elusive" and are based "on some very important and basic assumptions that can be made only by the government," on such matters as the length of the period during which plutonium production is required.

Bonneville can market 400,000 kw of firm power as soon as the dual-purpose reactor is authorized, Luce declared. Cost of the Hanford power would be at least as low as any new generation in sight and would help Bonneville maintain its present rate structure, he said. In addition, the Hanford plant is the only new plant that could begin generating power to alleviate a power shortage that might develop in the event of a critical water year in 1965, said Luce.

As new sources of hydroelectric energy, the convention looked toward upstream storage in British Columbia, Nez Perce Dam on the Snake River and Libby Dam on the Kootenai River in Montana.

Owen W. Hurd, managing director of the Washington Public Power Supply System, lauded the 2,100,000-kw Nez Perce Dam as "the recognized key to the comprehensive development of the Middle Snake" but was willing to accept Interior Secretary Stewart Udall's recommendation to the FPC that approval of a license for either Nez Perce or High Mountain Sheep projects be delayed for further study of fish passage facilities. At his suggestion, the convention adopted a resolution commending Udall and President Kennedy for proposing a "crash program" in this area.

Major General Alfred D. Starbird, North Pacific Division engineer for the Corps of Engineers, described 350,000-kw Libby Dam as "one of extreme interest to us at the present time and one we hope will go forward most rapidly." He estimated that four years would be required for planning and another six or seven years for construction.

Ray G. Willison, British Columbia minister of lands and forests and member of the B. C. Power Commission, predicted that "many important decisions will be made in the next four to six months" in regard to constructing dams at Mica, Arrow Lakes and Duncan Lakes on the upper Columbia. He expressed confidence these decisions "will enable construction to start" but pointed out several developments which may delay Canadian ratification of the proposed U. S.-Canadian treaty for upstream development of the Columbia.

Kirby Billingsley, left, was host to the convention in his capacity as manager of Wenatchee's Chelan County PUD; Dan Jolly, Franklin County PUD commissioner, was elected as the association president

Even with favorable public opinion, ratification will be slow, as licenses for the three dams cannot be requested until completion of formal engineering studies. Agreement also must be reached between the Canadian federal and the B. C. provincial government on financing and operating the projects.

Resolutions adopted by the convention oppose the proposed merger of the Pacific Power & Light Co. and the California Oregon Power Co., as well as construction of any private electric company transmission line that would duplicate BPA transmission lines. (The line proposed by Portland General Electric Co. and Pacific Power & Light Co. to link Wanapum and Swift Dams was described as already "dead.") The Secretary of the Interior was urged to file a petition of intervention in favor of full development of the Clark Fork River and in opposition to the license application of the Montana Power Co. for the Buffalo Rapids projects.

Dan Jolly, Franklin County PUD commissioner of Connell, Wash., was elected president of the association for the next year, after serving in that capacity since the recent death of Dean Barline. Edwin C. Schlender, manager of the Raft River Electric Cooperative, Malta, Idaho, was elected vice president and Victoria, B. C., was chosen as the site for the 1962 convention.

To insure fail-proof multiple lighting control

There's nothing untried, no lack of field proof when you install Precision photocontrols. Major utilities—with hundreds of thousands of installations—have proved Precision's reliability on their lines for more than 4 years.

The reasons? Precision is *simply* the best-engineered, best-built tubeless photocontrol at any price. Because it pioneered tubeless lighting control, it gives you more proven performance on all installations — 500-watt farmyard lighting to 3000-watt white-ways.

Advanced engineering Precision embodies 2 time-proven components — a wide-area cadmium sulfide cell directly regulating a long-life integrating relay. No capacitors, rectifiers, sensing leads or tubes to "fail out" in Precision. Other control circuits need up to 18 such fragile components.

On-the-lines dependability Inconspicuous transparent housing gives *total area exposure* to light sensing cell. No shading, no shielding in Precision to overload cells or intrude upon "human eye" responsiveness. Calibrations are made directly on the switch for light levels 0.5 to 10 ft. candles. Housing admits light freely but is impervious to dirt, insects, moisture. Precision uses a 1-watt cell for long life. Its conservative rating never is exceeded in operation.

System-wide versatility Precision controls, guaranteed for 2 years, can be used interchangeably on every pole. Model D-2-275 conforms precisely with EEI-NEMA standards for locking-type controls. Its full-visibility housing, with molded index marks, simplifies North orientation for system-wide uniformity and makes it the easiest of all controls to "sight" wherever local light levels demand special consideration. Model D-2-375, with 3¾" ID, puts modern control on older poles. Model D-5 fits standard watt-hour meter base and 22 adaptors and mountings make *one* control — Precision — the only control you need to stock for your entire multiple system.

Technical data on Precision are summarized below for your quick reference guidance in extending your automated multiple lighting systems with insured dependability. Precision welcomes comparative appraisal — in your labs and on your lines — with the performance of any other device for lighting control at any price.

Model	Supply voltage*	Type of switch	Load rating in volt/amps	Means of attachment
D-2-275	105/130	SPST	1800	Locking-type
D-2-375	105/130	SPST	1800	Locking-type
D-4-275	210/250	SPST	1500	Locking-type
D-4-375	210/250	SPST	1500	Locking-type
D-5	105/130	SPST	3000	Meter base
D-6	210/250	SPST	3000	Meter base
D-7	105/130	SPST	3000	Meter base

All Precision controls have Normally Closed contacts at night. Controls with contacts Normally Closed **during the day** will be furnished on specification. D-2-275 and D-4-275, 2¾" I.D. D-2-375 and D-4-375, 3¾" I.D. *25/100 cycles, AC

Operating data on locking-type models

Inrush current rating: 120 amps at 120V; 60 amps at 240V

Time delay: Minimum 15 seconds

Temperature range: —40°F to +170°F (—40°C to +77°C)

Power consumption: Less than 1.4 watts average

Operating levels: 0.5 to 10 ft. candles, or higher as specified

Standard turn ON: 1.5 ft. candles

turn OFF: 0.5 to 1.5 ft. candles higher than turn ON

Lightning arrestor: Gap type, with 25,000 amp surge current capacity; 2000V impulse spark over.

Field service, on any aspect of Precision-controlled lighting, is immediately available from Precision engineering representatives in more than 50 U.S. and Canadian cities.

Write or wire for cost-saving quotations:

PRECISION MULTIPLE CONTROLS, INC. • Ridgewood, New Jersey

The difference between night and day

specify Precision Model D-2-275, pace-setter among all EEI-NEMA standard photocontrols

Model D-2-275 is shown approximately 2½ times actual size.

ELECTRICAL WEST

VOL. 126, NO. 5 MAY 1961

TRIBUTE TO THE UNKNOWN SOLDIER

When the plant is dedicated and the president talks about "engineering advances, the salesman smiles. He had been selling the idea to engineering for two years.

His participation in AIEE and nearly every other association makes them fly. He takes every dirty committee job and performs willingly. When the convention comes to a close he still has props to return—and a sick expense account to nurse.

He listens to endless complaints—business and otherwise—and tries to help.

He's a vanishing breed. A real free enterpriser. He doesn't run to anyone when the going is tough. He plays his skill against the pack. What he lacks in skill or education he makes up with a 60- or 70-hour week.

The thought would startle him but, when it comes to living, he scores high as a true Christian. He knows that he has to live by the Golden Rule—or fail.

Today our industry is buzzing with grave problems. Prices are soft. There is a shortage of the rare earth known as purchasing statesmanship. People are acting like people!

Everyone understands the problem. (It was the other guy's fault.) There are some solutions. Pricing philosophies, they are called. None of them are new and none of them will work. They have as their purpose a return to the "good old days." Agreement, understanding and proper action based on occult readings from the field. Dream on—!

HEY YOU WITH THE STRIPED TIE! What's with all that research—all those slogans. Haven't they produced a better mousetrap? One people will pay for?

Here's an idea that won't program—or automate—but offers promise of a solution. No panacea, to be sure. But an honest to goodness free enterprise solution to a free enterprise problem. We will lay our money for long-term profit and market position with those companies whose best efforts are directed toward selling. (We use the word selling rather than marketing, advisedly.)

The woods are full of salesmen that know how and where to get a fair price. In a very real sense they add value to a product and customers recognize it. Those who need a price margin always—well. . . Those that produce—help. Get the accountants off their backs. Cut out the surveys. Give them competent office assistance. And enough expense money to do what you expect.

There he is—the salesman—wonder of the ages, midwife of progress, catylist of profit—and today's unknown soldier.

Dear Mr. President*:

Been looking at the cost of the New Frontier. At this sitting you have increased expenditures over the record peacetime budget at the rate of one dollar for each working American for each working day since you took office. Boom!

Is this the meaning of "Ask not what your country can do for you but what you can do for your country"?

For my money—and that's what you're spending—you're doing too much for me now. Seems to me the problem is one of the government's insinuating itself into our affairs and sending us the bill. The proposed federal transmission for the Colorado River storage project is a case in point. Private businesses will build it, saving $137 million in federal money. If the government does build it you will lose an additional $96 million in income taxes and local governments will lose an equal amount. I am aware of your party's desire to federalize the power industry. I hope you will review this program in terms of the pressing need to concentrate federal money for space and for a mobile military force capable of establishing our position in Cuba and Laos.

Can't socialized power wait?

* Any American with 4c and conviction, can write the President or his Congressman.

PRIEST RAPIDS

PARTNERSHIP ON THE COLUMBIA

Three PUDs feel that local development of the Columbia is best. Their power is an important part of private power reserves

On a stretch of the Columbia, upstream from the Big Fork at Pasco, three PUDs are progressing with four giant dams—totaling more than 4,000,000 kw of ultimate capacity. In combination the PUDs' loads would only challenge one of the giant generators and yet they will rank among the Northwest's largest power suppliers.

These giant PUD power projects are a "partnership" that was brought about by the desire of the PUDs to develop the power sites in their own areas and by the necessity of the investor-owned utilities in the Pacific Northwest to find a dependable source of power to serve the ever-growing needs of their customers.

This power paradox is the result of (1) Washington State's PUD legislation which makes a generation facility owned by a private company subject to condemnation and purchase. (2) The Eisenhower partnership philosophy of the early '50s. (3) Strong leadership and a desire for comprehensive use of the river to develop the local areas. (4) The strong opposition from public power proponents in and out of Congress to construction of large hydroelectric projects by investor-owned utilities that make it extremely difficult for these utilities to get construction authorization.

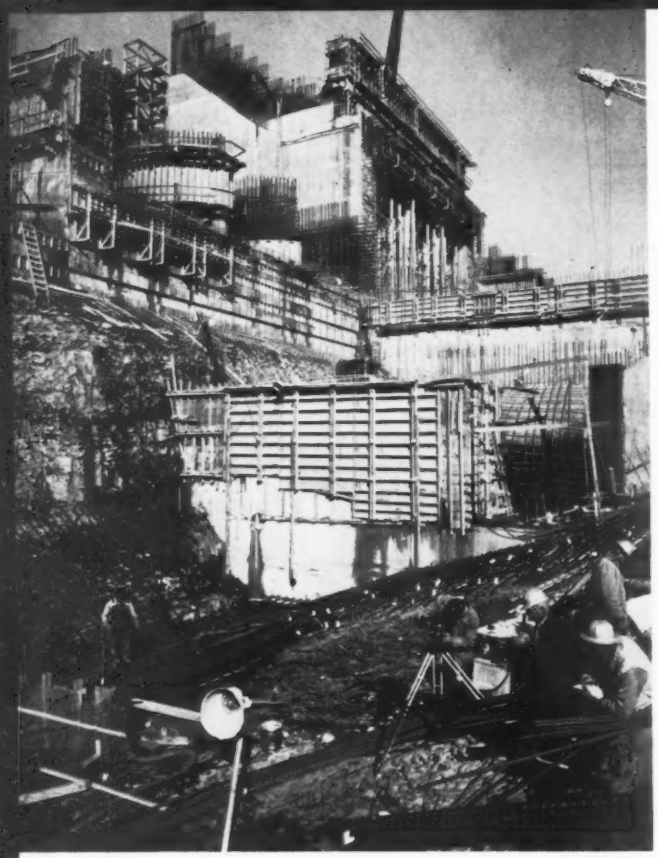
The chemistry of Northwest power politics is not easily understood outside of the region. Early abuses of labor in Northwest lumbering created an unfavorable public attitude toward business. During the depression years of the early '30s pressure from the grange resulted in the PUD act, sometimes called the Grange Power Bill.

This legislation enabled county groups to draw and quarter the private interests by condemnation and purchase. As the PUDs sprang up, they left an uneconomic checkerboard to serve. Puget Power, under pressure by PUDs and local municipal utilities, was the hardest hit and as a result nearly went under.

It appeared for a time that public power might take over completely. Eventually the pendulum of public opinion began to swing in the opposite direction. The people decided there was room for both and apparently felt that all public power might bring with it all of the evils that had been attributed to private power operation.

The rapid and inequitable federalization of the Northwest power under the Roosevelt and Truman administrations had made powerful political opposition.

Eisenhower's Interior Secretary Douglas McKay's partnership philosophy found ready support among the private interests. To the dismay of many they found support in the frustration of several of the PUDs whose supporters had "gone the route" with federal power in hopes that low cost power would attract industry. The term partnership in fact grew out of Chelan County's



WANAPUM

negotiations with Puget Power on Rock Island Dam dating back to 1947. Rumor that a coast city was planning to condemn Rock Island caused the Chelan PUD to hurry and file its condemnation first. Friendly negotiations proceeded. In 1950 Alcoa was looking for power. BPA agreed to supply it when it was available. **Everyone needed something the other had and partnership was born.** Under a complex agreement, Chelan leased the unfinished portion of Rock Island Dam and increased capacity 200%. Alcoa located in Wenatchee and got Rock Island power until BPA had a supply. At this point the power reverted to Puget under a power sales contract.

PUD Profile

PUD commissioners cannot be readily classified as all for this or all for that. It would be impossible to tag them all with "socialist" or "public power" labels even though their PUD affiliation would lead some to that conclusion. Among the many people associated with the PUD movement you can find individuals who would make an avowed socialist look like a conservative but you can also find many individuals who sincerely believe that a PUD would benefit their county and who by no stretch of the imagination believe there is anything socialistic about public ownership of electric facilities. Many PUD supporters are passionately provincial. Their concern is in their own local area, its farms and crops and people. They look upon PUDs as a community service. This element of the PUD movement might be said to be "not anti-private power but pro-local development."

Understanding this, it must be said they are dedicated, capable—and that their accomplishments have been considerable.

Private Companies Dilemma

The investor-owned companies were unwilling even to try to build a dam in Washington State where it would be subject to almost certain condemnation. Finding it difficult to secure a license for any feasible project elsewhere in the Pacific Northwest and, facing a "freeze-out" on federal power subject to sale under provisions of the preference clause, the investor-owned utilities were willing virtually to underwrite the financing of the big PUD projects in order to gain an assured supply of electric power for a long period of time.

Washington Water Power fought the condemnation of its Chelan Falls Dam by the Chelan PUD for at least 10 years but finally agreed to a negotiated purchase when the PUD agreed to sell all of the output of the project to WWP for a period of 35 years. The company's license of the project was good for only 17 more years.

Priest Rapids and Wanapum Development

Priest Rapids has been recognized as a potential dam site for half a century. Individuals, private companies and federal agencies have all been interested in the area. In 1945, the Corps of Engineers carried on investigations for a high dam—including core drilling.

THUMBNAIL SKETCH OF GRANT COUNTY PUD

1938: Grant County election authorized foundation of PUD

1941: REA loan of $600,000 authorized

1942: Began operation with four employees and 24 miles of line purchased from independent power systems

1945: Acquired by condemnation and purchase from Washington Water Power 128 miles of line and 2,300 customers

1946: REA loan retired

1946: Began purchasing power from Bonneville Power Administration

1948: Acquired Washington Water Power lines in Hartline and Warden

1950: Discussions of Priest Rapids Dam begun

1955—November: License to construct Priest Rapids and Wanapum granted

1956—May: Power contracts signed guaranteeing purchase of Priest Rapids power

1956—September: Construction started on Priest Rapids

1959—July: Wanapum construction started

Today: Priest Rapids essentially completed except for final cleanup Wanapum 46% completed. PUD has 14,205 customers, 1,776 miles of line, 184 employees and peak load of 87,115 kw

1964—September: Completion of Wanapum Dam

THUMBNAIL SKETCH OF CHELAN COUNTY PUD

1937: PUD was organized by election
1948: Purchase of Puget Sound properties in Chelan County
1951: Leased unfinished portion of Rock Island Dam and installed six generators
1954: FPC permit to study Rocky Reach
1955: Acquisition of Washington Water Power's Chelan Dam and power plant and remaining county distribution facilities
1956: Purchased Rock Island Dam from Puget Power
1956: Start of Rocky Reach Dam
1961—June: First power from Rocky Reach
1962: Completion of Rocky Reach project

Grant County PUD's interest began with informal discussions in 1950. The district's management then secured the American Power & Light Co.'s plans for a dam that had been shelved during the depression. Before proceeding too far, the PUD officials took a reading on Main Street. Consensus: **If low cost power will help develop Grant County—Go Ahead.** By May of 1952, PUD officials had determined that the Army Engineers had no firm commitments to build, so a resolution to proceed was adopted and plans set in motion.

Dr. Axel E. Strom, Grant County PUD's market development chief, smiles, "We probably should have known that we couldn't do it—but we didn't. No one paid any serious attention to us until we had all of the ground work done. At the time the partnership philosophy became national policy, we had the blessing of both public and private groups."

Harza Engineering was retained for a feasibility study. Meanwhile the private companies in the Northwest were contacted and offered options on the project's power. So ably did the PUD's men chart their course that no unfavorable testimony was heard before any of the government committees. Congressional approval was nearly unanimous. The prime mover during the promotional phase was Glen Smothers, then district manager. Even though Smothers later resigned under fire as a result of questionable personal conduct, he is credited with a remarkable job of organizing and directing.

The engineering studies pointed to two low dams rather than a single high structure. Hence Wanapum Dam. The FPC license specified construction at Wanapum to follow the start at Priest Rapids by two years.

Revenue bond financing for the project was made possible by the power sale contracts signed by 12 Northwest utilities. Under the terms of the contract, these utilities became responsible for the same pro rata share of the annual costs as they received in power. In essence, they were co-signers for a $360 million loan.

The power sale contracts are such that the PUDs are not selling the power and making a profit. The project books are separated from the PUD books. All PUD generation systems are separately financed and separately accounted for—as is the distribution system. The sale of power covers debt service plus reserve and contingency funds. Excess monies are used for early loan retirement. At the end of 50 years, the dams will belong to the PUDs free and clear.

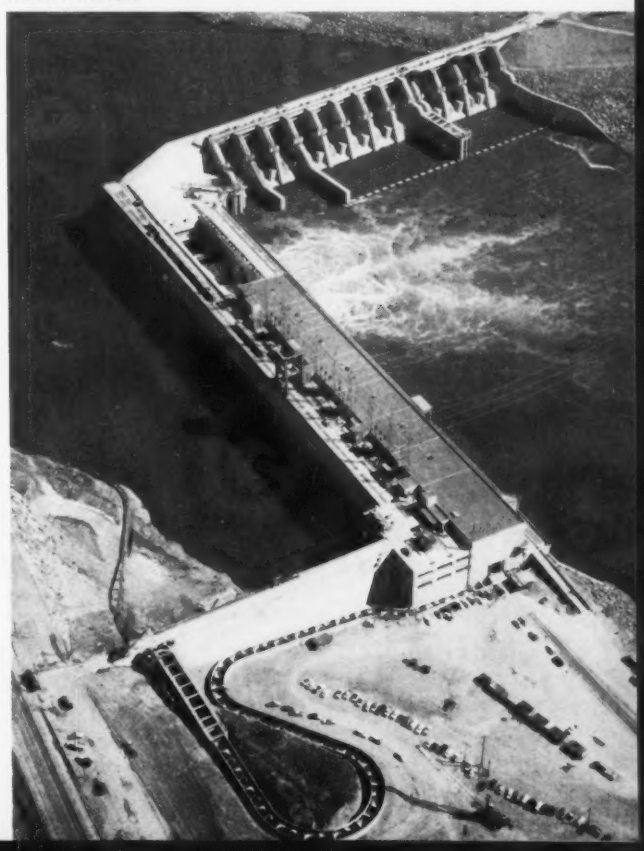
Without question, the private companies have made the dams possible. A strange partnership. In exchange for guarantee of financial responsibility (see table for power allocations), the power purchasers receive federal tax free power.

Priest Rapids is substantially completed except for modifications and repair to transformers and generators supplied by an English firm. Fortunately, the PUD's turnkey contract holds the contractor Merritt, Chapman & Scott responsible for acceptability of the electrical equipment — a clause worth millions to the contractor whose contract called for $1,300 per generator day for early completion. Wanapum Dam, now 46% completed, will be furnished with all North American manufactured equipment.

Rocky Reach Developments

Kirby Billingsley, the PUD's manager, has provided the leadership for Chelan County PUD. Billingsley's background is journalism, where for years he edited the *Wenatchee Daily World* for publisher Rufus Woods. Woods is remem-

ROCKY REACH



Power Project Data Summary

	GRANT COUNTY PUD		CHELAN PUD	DOUGLAS PUD
Type	**Priest Rapids Reinforced concrete and earthfill**	**Wanapum Reinforced concrete and earthfill**	**Rocky Reach L-shaped gravity concrete**	**Wells Hydro-Combine and earthfill**
SIZE OF DAM:				
Total over-all length—ft	10,138	8,320	4,900	4,105
Reinforced concrete—ft	2,427	2,920	2,900	1,120
Earthen embankments—ft	7,711	5,400	2,000	2,985
Maximum height from deepest point of excavation—ft	178	185	127	207
Head—ft (approx.)	79	80	92	65
POWER HOUSE:				
Number power units initially	10	10	7	7
Turbines, type	Kaplan	Kaplan	Kaplan	Kaplan
Horsepower per unit	144,000	120,000	140,000	112,000
Revolutions per min.	85.7	85.7	90.0	85.7
Name-plate rating per generator at 0.95 pf—kw	78,850	83,125	101,650	70,600
Total capacity—kw	788,500	831,250	711,550	568,000
Ultimate capacity—kw	**788,500**	**831,250**	**1,118,150**	**760,000**
Reservoir—sq miles	13	23	14.2	15.2
Cost	$166,000,000	$195,000,000	$195,000,000	$177,000,000
Estimated completion date	April 1, 1961	Sept. 1964	Nov. 1, 1961	Oct. 1, 1966
Design engineer	Harza Engineering Co.	Harza Engineering	Stone & Webster	Bechtel Corp.
Contractors	Merritt-Chapman & Scott	Grant County Constructors	Stage I: Rocky Reach Dam Builders Final Stage: Rocky Reach Contractors	
Contract power purchasers	Cowlitz County PUD Eugene Water & Electric Board City of Forest Grove City of McMinnville City of Milton-Freewater Pacific Power & Light Portland Gen. Electric Puget Sound Power & Light Wash. Water Power City of Seattle City of Tacoma Kittitas County PUD	Cowlitz PUD Eugene W&EB Forest Grove McMinnville Milton-Freewater PP&L PGE Puget Power WWP	ALCOA PP&L Puget Power PGE WWP	Puget Power PPL PGE Okanogan PUD
GENERAL QUANTITIES (estimated):				
Earth & rock excavation—cubic yards	2,910,000	9,500,000	3,550,000	4,140,000
Earth & rock fill—cubic yards	3,105,000	3,500,000	3,700,000	2,273,000
Concrete—cubic yards	844,000	1,000,000	1,032,500	426,000
Steel, reinforcing—tons	23,000	30,000	33,500	11,450

WELLS

bered in the Northwest as president of the Columbia River Development League and passionate proponent of federal power. Woods' notion was that power development on the Columbia meant commerce for the Wenatchee area. But the vagaries of federal power did little for Wenatchee. The power always seemed to go elsewhere. Most promising action from the community development came in 1951 when the PUD leased the unfinished portion of Rock Island Dam from Puget Power and added six generators. This power source lined an Alcoa reduction plant and pay roll for Wenatchee. This action took place while Billingsley was on the board. In 1953 he resigned to become manager.

Billingsley brings many rare capabilities to his work. His newspaper background gives him a keen sense of how the folks on Main Street feel—and what to do about it. He is politically savvy and perfectly willing to walk a line between public and private power. He is candid—even when it hurts. "We went too far with federal power—and I was part of it. It was getting out of hand. The PUD way is better all around." He is equally pointed about private companies' failures to serve in the best interest of the user—or about PUDs getting too headstrong. Kirby Billingsley adds great impetus to the Chelan County viewpoint. He represents a strong, constructive force in the PUD movement. Sticking to policy making, Billingsley has built a capable organization of utility specialists.

The partnership construction of Rocky Reach goes a step further than the Priest Rapids-Wanapum programs. At Rocky Reach, the five private companies have signed contracts to purchase 100% of the project's output for the next 50 years. The district can, if the need arises, withdraw a small amount of the power on due notice.

Wells Project

Moving rapidly toward reality is the Douglas County PUD's Wells project. The district has submitted an amended application to the FPC for license to construct the Wells project and is working toward a construction start in July of 1963, with first power by October 1966.

Very significant hydraulic model testing of a new design dam is currently under way. The new design is a radical departure from conventional dam construction on the Columbia. An earlier design for Wells project included separate spillway, power house and switchyard structures. The new design shrinks the concrete section of the dam to about the size of the old power house structure. This new section, dubbed the "hydro combine," contains the generating units located in concrete cylinders with spillway openings between each generator unit. The double-gantry cranes serve all operating requirements of the generating units, intake gates and spillway deck. Staircase-type fish ladders will be located at each end of the hydro combine and will function as connecting walls between the adjacent earth filled embankments.

The major advantages of the design are (1) the reduced section of concrete structure—which was formerly the spillway section—is now an earthen structure. (2) The hydro combine will be located on the most favorable footing which, fortunately, is adjacent to the river on the bordering flood plain. This factor will enable construction to proceed with a minimum of cofferdamming and without any interference with the natural flow for the first 2¼ years of a 3¼-year construction program.

Preliminary estimates place the savings for the hydro combine approach at from $10 to $15 million. This is a sizable figure against a total project cost of around $177 million.

The seven units to be installed initially will have a peaking capacity of 568,000 kw, which will generate 3,470 million kwh of energy during an average river-flow. Provision will be made for three additional units for installation at such time as suitable upstream storage is developed.

The partnership program to date has been one motivated by expediency. The present pro-federal power climate in Washington will test its sincerity.

THUMBNAIL SKETCH OF DOUGLAS COUNTY PUD

1936: Douglas County PUD organized

1945: Acquired Washington Water Power properties and began operating distribution system in north end of Douglas County

1950: Acquired Puget Sound Power & Light properties in south end of Douglas County

1953: Discussion of Wells project began

1954: Applied for and received preliminary permit to investigate the Wells site

1955: District and Kaiser Engineers survey project

1957: Applied for PFC license to construct Wells project

1961: Filed amended application to FPC license to construct Wells project

1963: Construction start on Wells

1966: First power on Wells

NEW RUNAWAY SPEED LIMITERS

A new device for Rocky Reach turbines which allowed this utility to reduce maximum allowable speeds from 2.67 to 1.85 times normal

E. C. METCALF, CHIEF ENGINEER, CHELAN COUNTY PUBLIC UTILITY DISTRICT
GRANT H. VOADEN, ASSISTANT CHIEF HYDRAULIC ENGINEER, ALLIS-CHALMERS MFG. CO.

Another major hydroelectric plant located in the State of Washington, on the main stem of the Columbia River, will be placed in operation this year—the Rocky Reach station, owned by Chelan County PUD, and containing seven of the largest Kaplan turbines presently constructed. Designed and engineered by Stone & Webster Engineering Corp., this major development shares with its predecessors the pattern of unusual and sometimes drastic solutions to economic and construction problems. Since Rocky Reach, by virtue of being financed through the sale of revenue bonds, must meet rigorous standards of fiscal feasibility, every technological and construction device to reduce costs has been explored.

Consequently, one of the early decisions was to explore possible cost reductions in generating equipment by limiting overspeeds. The turbine speed limiting device developed by the turbine manufacturer became the key factor in the solution of this overspeed problem. **By its use the maximum speeds were reduced from 2.67 to 1.85 times normal.** By this speed reduction it was possible to realize a total net cost reduction of $2,065,000 for the seven turbine-generator units. Following is a discussion of the technical principles involved in the design and operation of the speed limiters.

The Kaplan-type turbines with six blade runners will operate at 90 rpm over a head range from 55 to 98 ft and have a guaranteed output of 140,000 hp at the normal head of 92 ft. Generators are rated at 107,000 kva.

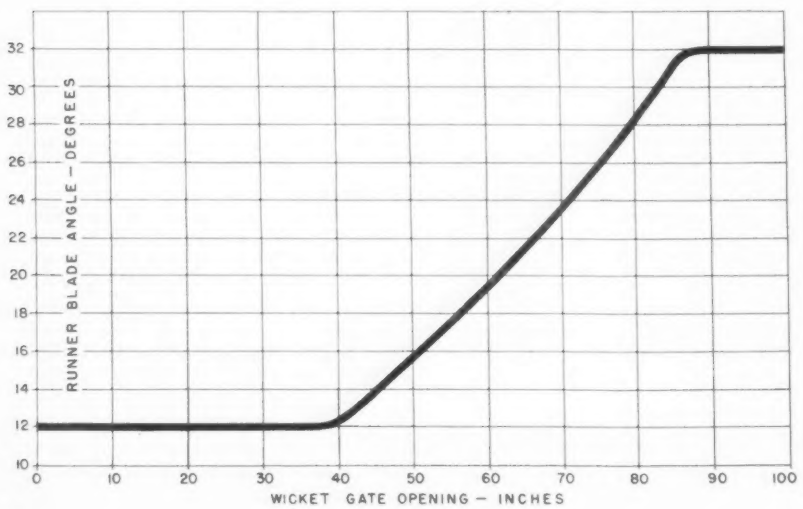
In a Kaplan turbine, the blades and gates are normally controlled by the governor through a cam so that they constantly have the relationship which gives the maximum turbine efficiency over the full range of load and head. A "cam curve" determining blade angle-gate opening relationship, designed for rated head at Rocky Reach, is shown.

Normally, whenever the unit is thrown off the system, the governor will close the wicket gates, causing the blade angle to be reduced, limiting the resultant speed rise to the order of 20 to 25%. If for any reason the governor cannot function properly when the generator is disconnected from the system, runaway speed will occur. Therefore, the generator must be designed for the maximum speed that can occur. Prior to the introduction of the new runaway speed limiter, maximum runaway speed which had to be considered was 2.5 to 3.0 times normal speed.

On the Rocky Reach turbines, the maximum runaway speed without the speed limiters would have been 240 rpm or 2.67 times normal. This speed could have been attained at maximum head if the blades and gates got out of their proper "on-cam" relationship to some "off-cam" relationship of low blade angle and high gate opening. Even with the on-cam relationship maintained, the runaway speed could have reached 200 rpm or 2.23 times normal. **Because the new overspeed device has proved to be so dependable, the Rocky Reach generators are being built for only 85% overspeed.** They are the first units on which full advantage has been taken of the savings made possible by use of the runaway speed limiter.

It was already known from previous model and field tests that the runner blades as designed by this manufacturer tended to go open on overspeed. Also known were the actual steady-state overspeed (rpm) values for various runner designs, blade angles, gate openings, etc., and how these values varied with cavitation characteristics. However, there was still the important question of friction. Would the net hydraulic unbalance be sufficiently in excess of the friction to cause the blades to open fast enough to reach the desired pitch in time to prevent excessive transient overspeeds?

To determine the answer to this question, permission was obtained to run appropriate tests on units at the Nimbus plant of the Bureau of Reclamation and at the McNary



A "cam-curve" determining blade angle-gate opening relationship, designed for rated head at Rocky Reach is shown left

plant of the Corps of Engineers, which were already in operation.

Alterations to these units, necessary to the tests, consisted of installing temporary by-pass piping and manual quick opening valves between the two oil pipes leading from the blade control valve to the oil head. Each individual test run was started with the unit on the line operating normally except that the gates were on manual control so that the governor had no function. After placing the blades and gates by manual control at some desired initial position, the main breaker was opened, allowing runaway speed to occur.

The by-pass valve was then opened instantaneously at a prearranged overspeed, thus freeing the blades from all control. The blades did go open at a rate sufficient to prevent any excessive transient overspeeds, the maximum speed attained on the run being 142 rpm which was 66% above normal.

Having confirmed the practicability of the basic principles of the runaway speed limiter the next step was the development of a dependable automatic by-pass valve directly responsive to turbine speed. Devices that could be easily disconnected or taken out of service would not be acceptable, nor would any device requiring fluid pressure for its operation, since the loss of oil pressure in the governor system might be the very cause of the runaway speed having occurred originally.

A practical solution to this problem was the use of centrifugally operated, spring-loaded valves located in the blade servomotor. Valves are opened by centrifugal force whenever a predetermined turbine overspeed is exceeded — thus opening a by-pass passage between the two ends of the servomotor.

At and above this overspeed, 126 rpm in the case of Rocky Reach, the net force on the blades is sufficient to open them if they are released from the normal cam control. Thus, whenever the turbine speed is above 126 rpm, the runaway speed limiter will free the blades from the normal control, will allow oil to by-pass the servomotor piston, permitting the blades to open as a result of their inherent unbalance at overspeeds, and thereby limiting the maximum overspeed to a relatively low value.

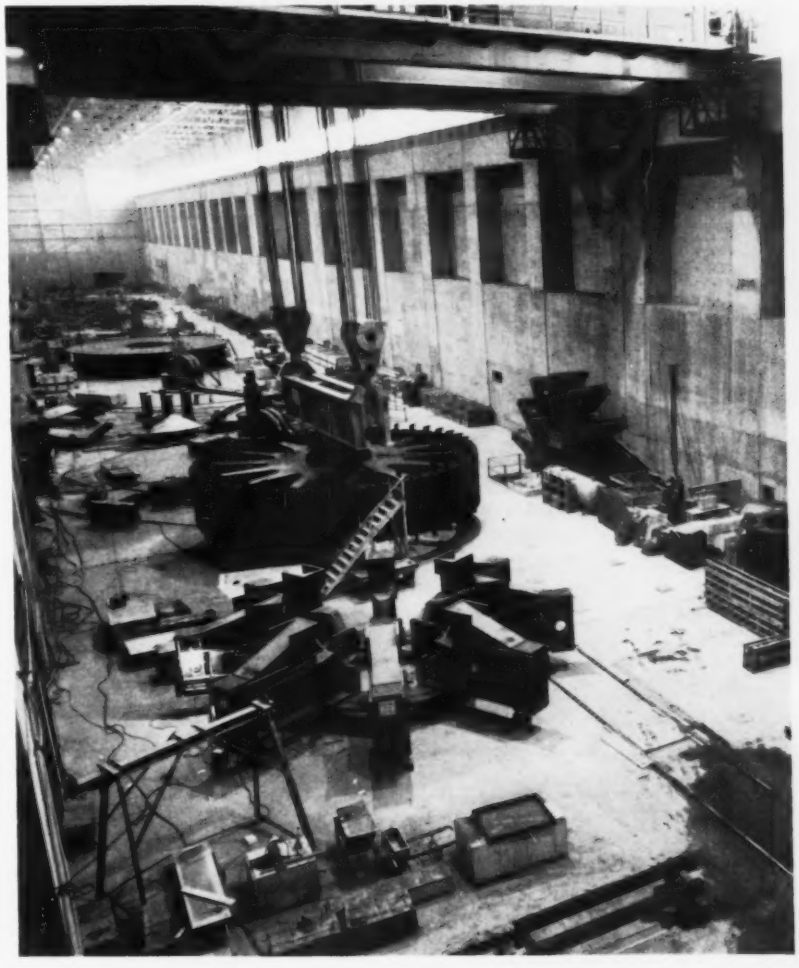
Runaway speed limiters of this type were installed in two 44,000-hp, 128.6-rpm Kaplan turbines of the H. H. Cochrane plant of Montana Power Co. The generators for these units were designed for the maximum (or off-cam) runaway speed of 356 rpm.

A series of overspeed tests was conducted on these turbines in 1958, and the devices operated exactly as anticipated. They opened at the exact preset overspeed to by-pass oil around the servomotor; the blades moved rapidly in the opening direction and the runaway speed was limited to 193 rpm.

From the above and similar data the dependability of the device was established. However, in discussions with Stone & Webster, design engineer for the Rocky Reach project, it was brought out that provision should be made for periodic inspection of the devices without the necessity of draining oil from the blade servomotor. This feature has been provided. It was also thought desirable to provide means of checking whether all of the six by-pass valves had opened or just a few of them. A reasonably accessible indicator for this purpose was therefore devised.

For the Rocky Reach turbines, a complete series of model tests was run in the manufacturer's hydraulic laboratory, to obtain complete data on performance, blade unbalance and runaway speed on an exact scale model of the runners actually being used for the project.

The runaway speed limiters employed at Rocky Reach are based on sound and proved basic principles. Their development and application to field installations have been carried out with caution appropriate to their important function. Their dependability is assured not only by the laboratory, shop and previous field testing but by the fact that they are built into the machines and cannot be tampered with or disconnected in the field. The decision to purchase the Rocky Reach generators with provision for "standard" overspeed of 85% was the logical result of this development.



Interior of Rocky Reach power house showing cranes about to lift 750,000 lb rotor of one of the project's seven generating units

SALINE WATER CONVERSION PLANT

A progress report on the operation of the seawater distillation pilot plant at Southern California Edison's Mandalay steam station

R. E. WHISTLER, MECHANICAL ENGINEER, SOUTHERN CALIFORNIA EDISON CO.

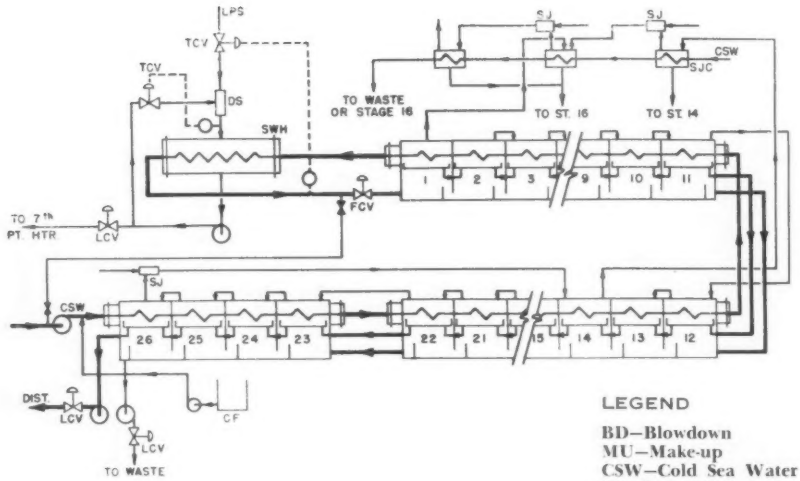


Fig. 1—Flow diagram of once-through system

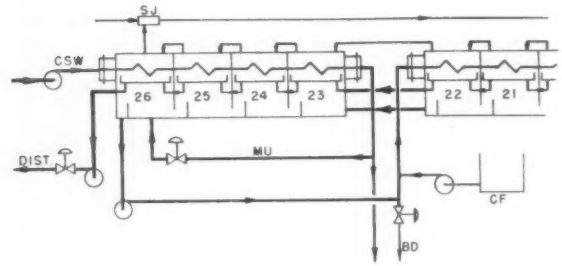


Fig. 2—Flow diagram of recirculating system, balance of diagram same as Fig. 1

LEGEND

BD—Blowdown
MU—Make-up
CSW—Cold Sea Water
DS—Desuperheater
SWH—Salt Water Heater
TCV—Temperature Control Valve
LCV—Level Valve
FCV—Flow Valve
SJ—Steam Jet
SJC—Steam Jet Condenser
LPS—Fifth Point Ext. Steam
CF—Chemical Feed (when used)
WCW—Warm Condensate Water

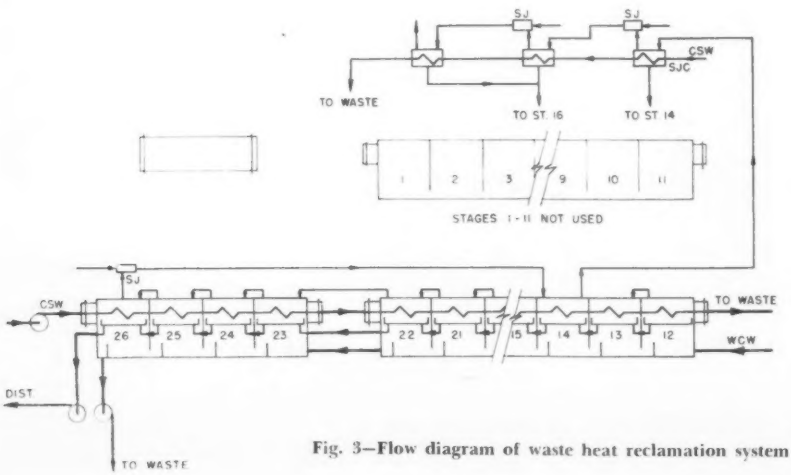


Fig. 3—Flow diagram of waste heat reclamation system

At the American Power Conference meeting on March 30, 1960, a paper entitled "Sea Water Conversion, By-Product of Power" was presented by Gordon F. Leitner, vice president of Cleaver-Brooks Special Products Inc. The paper gave the background, basis for design and general description of the sea water distillation pilot plant located at the Mandalay station of Southern California Edison Co. (EWEST, September 1959, p. 84.)

This pilot plant has now been in operation for more than a year and, because of its experimental nature, it is believed that a progress report may be of interest.

Experimental Program

An experimental test program, covering a three-year period, was developed in cooperation with Cleaver-Brooks and is divided into three phases, as follows:

Phase I—Operation for a short time at each of several conditions for which it was designed in order to test the operation of the equipment and controls and to compare actual operating data with the manufacturer's predicted data.

Phase II—Operation at each of several conditions with the objective of determining the optimum operating condition and the optimum scale prevention method.

Phase III—Operation at the one optimum condition, determined from the previous phase, to obtain accurate cost data.

Initial Operation

The plant was initially started on Dec. 23, 1959, and produced distillate within the range of the specified limit of sodium chloride content of 500 ppm total dissolved solids. Better quality could only be obtained at greatly reduced flow rates. It was believed that the plant was capable of producing water of much better quality than that required by the specification. Accordingly, alterations were made to the orifice plates and baffles were installed in some of the flash cham-

bers. These changes, together with other minor modifications and adjustments, made it possible to operate the plant at or above design flow rates, producing distillate in the range of 6 to 10 ppm TDS and with little or no attention by an operator.

Performance Tests

After initial operating trials were completed, performance tests scheduled under Phase I of the experimental program were carried out. The equipment was designed to operate at any of seven conditions of operation, as follows:

1. Once-through
   (a) 175 F—No chemical feed treatment
   (b) 195 F—Chemical feed treatment for scale control
2. Recirculation
   (a) 195 F—Low capacity
   (b) 195 F—High capacity
   (c) 220 F—Low capacity
   (d) 220 F—High capacity

Chemical feed treatment was specified for all recirculation runs.

3. Waste Heat Reclamation

Simplified flow diagrams of the three basic methods of operation listed above are shown in Figs. 1, 2 and 3.

At the time the tests were made, the brine-to-stage 1 temperature controller lacked the necessary parts to change the temperature range, thus limiting the maximum temperature to 190 F. For this reason it was decided to limit the tests to 1a, 2a, 2b and 3 with 2a and 2b limited to 190 F.

Chemical Feed Treatment

Because sea water, when heated to temperatures above 175 F, forms scale on the heating surfaces, some means of removing or preventing the formation of scale must be provided in sea water distillation equipment operating above this temperature if efficiency is to be maintained at a reasonable level. The principal objective in operating at higher temperatures is, of course, a greater output for a given size plant, since capacity is a function of the temperature range. The main objective of the experimental program is to test various methods of scale prevention under different conditions of temperature and flow.

As a result of preliminary tests of various scale control methods by Cleaver-Brooks, chemicals of the phosphate type prepared by Nalco Chemical Co. appeared promising. For this reason our experimental program was initially set up to test these chemicals. Three different compounds were tried, known as CB-1, CB-2 and CB-3.

In the initial test and a subsequent test in the once-through method of operation at 195 F only CB-1 appeared to be effective retarding the formation of scale. At 175 F, once-through operation was essentially scale-free without the addition of chemicals.

Cost is inevitably the most important factor involved in any sea water conversion process. Tentative production costs have been developed from data obtained from operation of the plant to date, based on the once-through system at 195 F using CB-1 chemical feed treatment. The same system at 175 F showed a slightly lower operating cost but the total cost, including fixed charges, was higher due to the lower output. It should be emphasized that these costs are derived from the plant as installed and are higher than those which would have resulted from a production-type plant designed for a specific operating condition and with no extra equipment for experimental purposes. One of the tables shows a summary of these costs.

It is estimated on the basis of the United States Office of Saline Water Procedure that a plant following the design of our experimental plant would produce water for a total cost of less than $1 per 1,000 gal. After further experimental work has been completed, a detailed cost estimate will be prepared and reported.

PERFORMANCE TEST DATA

Once-Through System	175 F		195 F	
	Design	Test	Design	Test
Temperature, sea water to Stage 1, F	175	175.5	195	195
Feed flow, gpm	840	835	710	715
Distillate flow, gpm	69.5	80.1	69.5	81
Distillate flow, thousand gpd	100	115	100	116
Sea water feed temperature, F	70	60.4	70	60
Temperature range, F	105	115.1	125	135
Distillate salinity, ppm NaCl	500 max.	6	500 max.	10
Economy, lb distillate per 1,000 Btu's heat input	5.7	5.8*	6.1	.....

Recirculation System	Low Flow		High Flow	
	Design	Test	Design	Test
Temperature, brine to Stage 1, F	195	189	195	189
Recirculation flow, gpm	715	781	1,040	1,035
Distillate flow, gpm	71	82	103.5	105.5
Distillate flow, thousand gpd	102	118	149	152
Sea water feed temperature, F	70	60	70	60.5
Temperature range, F	125	129	125	128.5
Distillate salinity, ppm NaCl	500 max.	8	500 max.	10
Economy, lb distillate per 1,000 Btu's heat input	6.1	5.7*	5.3	5.6*

Waste Heat Reclamation	Design	Test
Distillate flow, gpm	11.8	12.6
Warm feed flow, gpm	872	876
Warm feed temperature, F	84.9	80.1
Cold feed flow, gpm	872	960
Cold feed temperature, F	63	59.3
Temperature range, F	21.9	20.8
Distillate salinity, ppm NaCl	500 max.	7

*The precision instruments necessary for calculation of accurate economy figures were not ready for operation at the time the tests were made; therefore, these figures are only approximate.

OPERATING COSTS—PRESENT PLANT

Method of operation—Once-through, 195 F with chemical feed treatment

Output, gpd 114,000
Annual operating hours.... 8,332
Output, annual, gal.....39,577,000

	Cost $ per 1,000 gal
1. Operating labor	.081
2. Power	.100
3. Steam	
High pressure	.062
Low pressure	.296
4. Chemicals	.053
5. Miscellaneous supplies	.006
6. Maintenance	.202
7. Total operating cost..	.80
8. Fixed charges*	1.12
9. Total cost	1.92

*Figures at 15.75% of capital cost.

REAR LOT METERS

Meter breaker combination for use in metering at the rear lot line in underground distribution

WILLIAM L. DOUGLAS, METER SUPERINTENDENT
JACK FENNELLY, DISTRIBUTION ENGINEER, COLORADO CENTRAL POWER CO.

In 1960 Colorado Central Power Co. decided to incorporate metering at the rear lot line in underground distribution areas. This was done in order to accomplish several things. With one to four meters at a location, meter reading would become a simpler task. In addition, this type of installation would remove the unsightly meter riser from the wall of the house. Since, in most of these applications, a junction box of some nature would be necessary in any event, the meter pedestal serves a twofold purpose.

In the initial design of this pedestal, it was found that there was no suitable meter-socket-breaker combination being manufactured that could utilize large conductors and with necessary space for conduits. Therefore, it was necessary to collaborate with a manufacturer to have a special design made to fit our specifications.

Magnetic breakers were selected because it was felt that they had superior characteristics and would be less affected by ambient temperature. These breakers are used to protect the service loop to the customer's panel and are not to be considered as main breakers for the customer's use. These breakers are double pole, 100 amp, used in conjunction with either No. 2 or No. 1/0 copper equivalent service. Each meter socket is rated 100 amp throughout and is a four-terminal, three-wire, single-phase, 120/240-v socket. The terminals are AL/CU up to 4/0 conductor and the service loops may be either copper or aluminum wire. A ground bus with double connector on the load end and a single lay in line terminal is provided for ease of installation.

In the construction of this pedestal two 2-in. load conduits are provided from the bottom of the meter socket and stubbed into the customer's lot. These conduits are 10-ft lengths with 36-in. radius, 90° ells, field formed to eliminate costs of conduit fittings required for preformed ells. The same operation is performed on the 2½-in. line conduit. A 2½-in. LB condulet is used for line conductor entrance into the back of the meter socket. Prebused line terminals are connected at this point in the socket. When the customer is ready for permanent service, he (the customer) provides trenching and cable from the house to the breaker compartment. The service loop may be either in duct or direct burial at the customer's option.

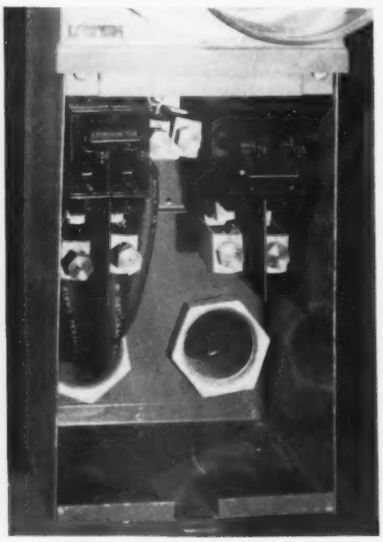
This same meter-breaker combination has been utilized in metering services run directly from pad-mounted transformer installations. Two-inch chase nipples, bushing and lock nut are used for line and load connections from the meter-breaker combination to the transformer. The service ducts are run through the connection hole provided in the transformer pad.

Due to concern over glass breakage because of lower meter heights, plastic meter covers are now being tried. They have now been in service six months and show no signs of discoloration or sandblasting.

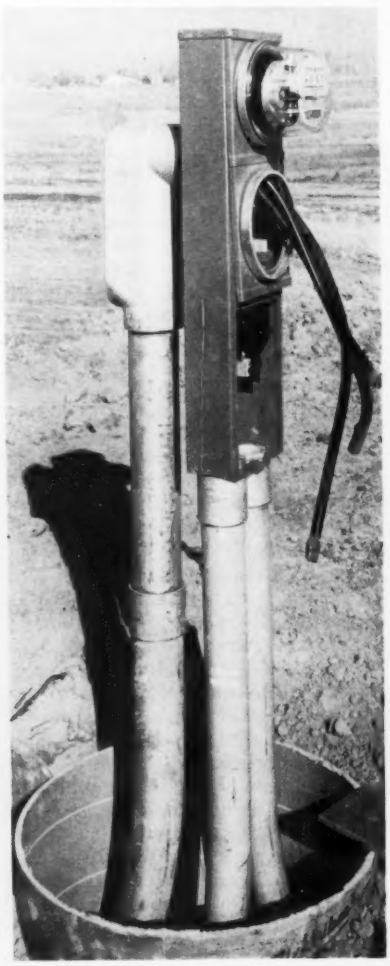
The cost to Colorado Central Power Co. of the meter-socket, breaker-housing combination, prewired and including four 100-amp breakers, is presently running $40 each. The approximate installed cost of the meter pedestal, complete with socket, is $70 per customer.

The same meter-breaker combination has been used from pad-mounted transformers

The breakers are 100 amp, double pole, for use with 1/0 or No. 2 service wires



When the concrete is poured this will make a neat metering-junction combination



WATER SHORTAGE IS FORECAST

Soil Conservation Service expects below normal streamflow for '61 season

HOMER J. STOCKWELL AND ROBERT T. BEAUMONT, WATER SUPPLY FORECASTING UNIT
SOIL CONSERVATION SERVICE, PORTLAND, ORE.

Forecasts for most of the snowmelt streams of western United States anticipate below normal flows for 1961 irrigation season. Severe deficiencies in streamflow will occur in the Central Valley of California, Nevada, Arizona and parts of Utah, and areas in or adjacent to the Great Basin in southern Idaho and Oregon. Streamflows near one-half of normal will be rather general. This will be the third year of shortage in many of these areas.

Forecasts are also for less than normal streamflow over the Rocky Mountain states, including the headwaters of the Colorado River, the Missouri River and the Rio Grande. Forecasts range generally from 70 to 80% of normal for streams originating at or near the Continental Divide.

Only in the Columbia River and its tributaries in Washington, northern Idaho and western Montana is streamflow expected to be near normal. The flow of the main stem Snake River through the State of Idaho will be comparable or a little less than for streams coming from the Rocky Mountains.

The water supply outlook this year will require substantial adjustments in crop acreage to reduce consumptive use demands for irrigation water and suggests further development and use of groundwater resources. The latter will increase power loads for pumping purposes.

The series of dry years has tended to gradually deplete reservoir storage. Many reservoirs are near minimum levels. Where hydroelectric power production is involved, the current reservoir storage and prospective inflow can be expected to affect future power generation. This does not apply to large reservoirs on such major streams as the Columbia River, and applies only to a limited extent on the Colorado River. The limitation on power production will likely affect reservoirs on tributary streams to some degree in practically all Western states.

Because of extensive water development and planning ahead, no major Western city is expected to have more than the usual water supply problems due to the low streamflow in prospect for 1961. Medium sized and smaller cities and towns can expect either curtailment of water use or further development and use of groundwater resources.

Basic information for this article was supplied by the Snow Survey Supervisors, Soil Conservation Service, and cooperators for all states except California. Information on water supply conditions in California was supplied by the State Department of Water Resources. This report was prepared under the direction of R. A. Work, head, water supply forecast unit, Soil Conservation Service. Data used includes that obtained on mountain snowpack by the agencies mentioned, and climatological and streamflow data supplied by the U. S. Weather Bureau and Geological Survey, and many other federal and state and private organizations.*

Over-all flows of major rivers for the April-September 1961 periods are forecast at 92% of normal for the Columbia, 70% for the Missouri and Rio Grande, 60% for the Colorado, about 70% as an average for the Sacramento tributaries and 45% for San Joaquin tributaries.

The accompanying reservoir chart and the map showing prospective streamflow graphically indicate general water supply conditions for 1961. The following paragraphs give the outlook by states briefly reviewed.

Arizona—The water supply outlook for irrigated areas in Arizona ranges from good to very poor. Storage in the Salt River Project reservoirs is 135% of the 1943-57 average, due to carry-over from last season. Storms on the Salt River watershed during March raised the forecasts from ex-

Prospective stream flow in the West for the period April-September 1961 (as of April 1)

*The Soil Conservation Service coordinates snow surveys conducted by its staff and many cooperators, including the Bureau of Reclamation, Forest Service, Geological Survey, other federal bureaus, various departments of the several states, irrigation districts, power companies and others. The California State Department of Water Resources, which conducts snow surveys in that state, contributed the California figures appearing in this article. The Water Rights Branch, British Columbia Department of Lands and Forests, has charge of the snow surveys in that province and likewise contributed the information here for British Columbia.

treme lows to 40 to 60% of average. This runoff supplemented by the carry-over storage should insure an adequate water supply for the Salt River Project.

Along the Gila, water supply outlook is very poor. San Carlos reservoir is virtually empty. Surface water supply will meet less than 10% of normal demands. Groundwater supplies will again be the principal source of irrigation water.

British Columbia – The Water Rights Branch of the Department of Lands and Forests reports that the coming spring and summer volume streamflows are expected to be above average. Without exception, the quantitative forecast called for either a little above or for a little below the normal snowmelt runoff. April 1 snow surveys on the provincial watersheds show that, at snow course elevations, snowpacks vary from above average in the West Kootenay to below average in the North Thompson, with all other regions reporting the seasonal snowfall close to average.

This past fall, above normal precipitation occurred on the Columbia, Fraser and North Thompson Basins, with the Kootenay Basin receiving its full share of rainfall. Stations in the Okanogan-Similkameen area report below normal precipitation, which indicates that only this particular region should have greater than the usual snowpack losses to soil priming.

California – California Department of Water Resources, coordinating agency for the California cooperative snow survey program, reports that water conditions in many areas of California will be the most critical since 1931. This makes the third consecutive dry year—with the outlook for this year to be the worst of the three in the area south of the latitude of Sacramento. Only in the upper Sacramento Valley and in the north coastal areas will water supplies be near or above average.

The vagaries of nature were aptly demonstrated weatherwise in California during March. The northern portion of the state, with its usual water surplus and near normal water conditions on March 1, received March precipitation amounts as high as 200% of normal. Rainfall during March in drought-stricken southern California hardly settled the dust. Seasonal precipitation to date in the important water producing areas of the Sierra-Nevada has been only about 65% of normal. By April 1, the season of major precipitation is generally over in most of California.

Even if precipitation were far above normal for the remainder of the season, serious shortages of irrigation water may be expected throughout most of the state. Shortages may occur even in municipal supplies where carry-over is inadequate and imported supplies are not available. This third consecutive year of below average surface runoff will put increased demands upon groundwater basins, resulting in further lowering of groundwater levels.

The soundness of the basic concept of transporting water south will be impressively brought out to the people of some fortunate areas of California this season. Many areas on the west side of the Central Valley below the Delta and as far south as Fresno will enjoy near normal water supplies with the help of water from Shasta Reservoir, 300 miles to the north.

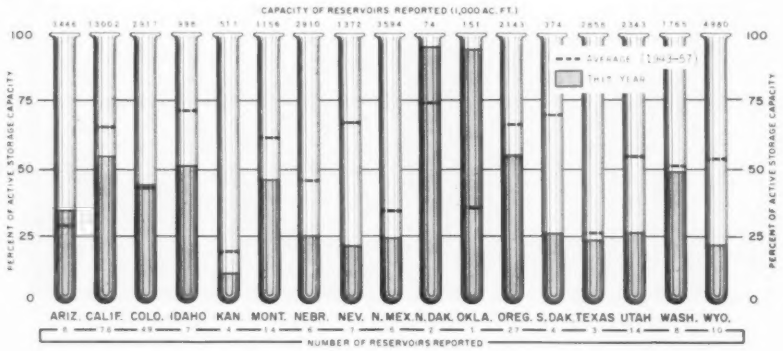
Colorado—Snowpack over Colorado was improved materially as a result of several major storms during March, but total snow accumulation remains below normal. The snowpack on the San Juan, Dolores and Animas watersheds doubled during the month of March. Forecasts throughout the state were increased by 10 to 20% from March 1 and now range from 60 to 80% of normal.

Recent snow storms have been almost as heavy on the plains as the mountains. The irrigated and plains areas are reporting good to excellent soil moisture. Soil moisture at the high elevations is poor except on the southern part of the Arkansas drainage which is slightly above normal.

Carry-over storage is below normal over most of the state. The only area that has normal or above carry-over is the South Platte. Reservoirs under the Big Thompson Project are above normal and will be an excellent supplemental supply for farmers in that area. Denver municipal reservoirs have above average water storage. Other drain-

(*Continued on page 77*)

Reservoir storage on April 1, 1961. Data supplied by Bureau of Reclamation, Geological Survey and water organizations


CAPACITY OF RESERVOIRS REPORTED (1,000 AC. FT.)
3446 13062 2817 395 511 1156 2910 3372 2594 74 151 2143 374 2855 2343 1765 4980
AVERAGE (1943-57)
THIS YEAR
PERCENT OF ACTIVE STORAGE CAPACITY
100
75
50
25
0
ARIZ. CALIF. COLO. IDAHO KAN. MONT. NEBR. NEV. N. MEX. N. DAK. OKLA. OREG. S. DAK. TEXAS UTAH WASH. WYO.
8 76 49 7 4 14 6 7 5 2 1 27 4 3 14 5 10
NUMBER OF RESERVOIRS REPORTED

STORAGE IN LARGER RESERVOIRS NOT INCLUDED ABOVE

NAME OF RES.	USABLE CAPACITY 1000 AF	USABLE STORAGE 1000 AF APRIL 1, 1961
ARIZONA		
LAKE MEAD	27,207	18,200
LAKE MOHAVE	1,810	1,680
LAKE HAVASU	619	560
CALIFORNIA		
TRINITY	2,500	427
BERRYESSA	1,600	1,133
CHERRY VALLEY	268	20
CACHUMA	206	157
TWITCHEL	250	0
NACIMIENTO	340	44
CASITAS	248	5
IDAHO		
CASCADE	653	262
ANDERSON RANCH	423	145
LUCKY PEAK	298	105
PALISADES	1,200	637
MONTANA		
FORT PECK	19,410	11,180
CANYON FERRY	2,043	1,506
FLATHEAD LAKE	1,791	1,043
HUNGRY HORSE	3,428	2,763
TIBER	1,316	645
NORTH DAKOTA		
GARRISON	18,100	4,740
SOUTH DAKOTA		
FORT RANDALL	3,800	2,607
UTAH		
BEAR LAKE	1,421	809
WASHINGTON		
ROOSEVELT LAKE	5,072	2,551

KANSAS STORAGE IS IN JOHN MARTIN AND GREAT PLAINS RESERVOIRS IN COLORADO. TEXAS STORAGE IS IN RED BLUFF IN TEXAS AND ELEPHANT BUTTE AND CABALLO IN NEW MEXICO. NEBRASKA STORAGE ON NORTH PLATTE ABOVE KINGSLEY RESERVOIR IN WYOMING AND NEBRASKA.

Home of Mr. and Mrs. Robert F. Escudero, La Canada, California. Builder—Robert F. Escudero.

WHEN THE FUTURE IS ALL-ELECTRIC

WHY BUY ANYTHING BUT A ***TOTAL-ELECTRIC GOLD MEDALLION HOME?***

"My husband builds total-electric homes because they're so modern—so efficient, they almost run themselves," says Mrs. Robert F. Escudero. "Naturally, when he built *our* new home, he made it all-electric. It's astonishing how much easier it makes housekeeping! I have more time for my family—important when you have a small son and a new baby."

Count the things that change for the better:

1. Flameless electric heat. "The electric heat pump warms our house in winter and cools it in summer—automatically. We set the temperature we want, and it heats the *whole* house *evenly*—quietly and *cleanly*."

2. A flameless electric range. "I love electric cooking, it's so fast—so clean—and doesn't heat up the kitchen. Pans stay cleaner with no flame."

3. A flameless electric oven. "Our flameless electric oven does wonders for meats—keeps the juices in—the meat tender. And we love to use our rotisserie," says Mrs. Escudero.

4. A flameless electric dryer. "The baby's things come out so sweet-smelling and soft," enthuses Mrs. Escudero. Flameless electric drying is odorless—prevents baked-in wrinkles.

5. A flameless electric water heater. Being flameless, electric water heaters can be placed in a closet, or a cabinet, anywhere—to bring you instant hot water.

WHAT IS THE GOLD MEDALLION HOME AWARD?

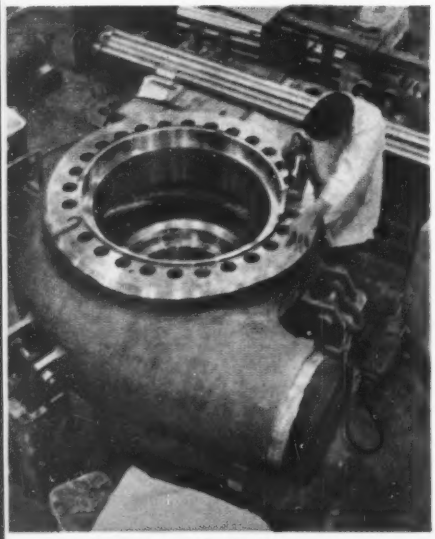
It is an award given only to total-electric homes. When a new home meets Gold Medallion Home requirements you know it offers: *clean, flameless, electric space and water heating; a clean, flameless, electric kitchen,* equipped with major appliances; plenty of *"Housepower"*—modern wiring to handle today's and tomorrow's appliances; *abundant lighting,* planned for comfort, convenience and beauty.

It costs so little to live better electrically. Why not move up to a total-electric Gold Medallion Home?

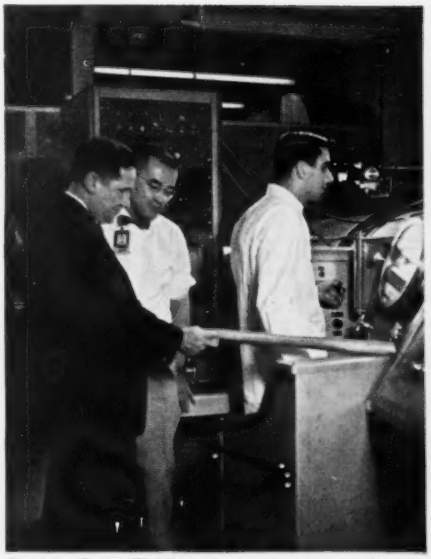
SOUTHERN CALIFORNIA Edison COMPANY

Thousands of Westinghouse people work full time on commercial atomic power

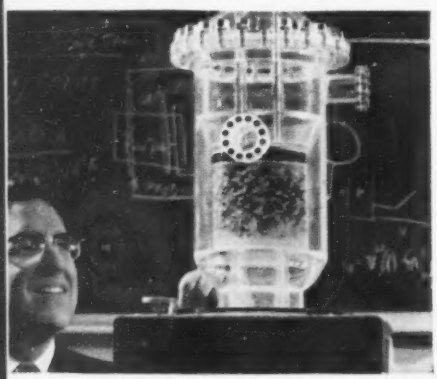
People, facilities and successful experience . . . these are reasons why Westinghouse is the world's leading supplier of nuclear power plants and components.



Westinghouse Quality Control inspector is working on a nine ton stainless steel pump casing at the Atomic Equipment Department in Cheswick, Pa. Department produces canned motor pumps, valves and control rod mechanisms.

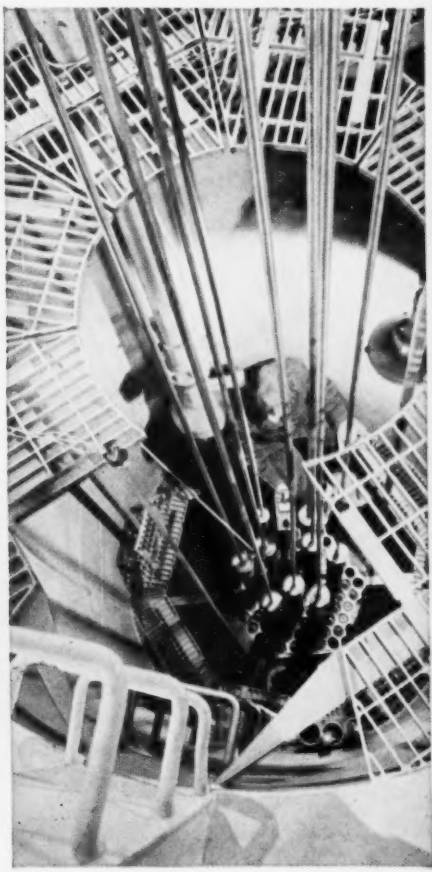


Electron Beam Welding of core components is one of the many special skills employed at the Atomic Fuel Department, Cheswick, Pa. Standard products of the department are reactor cores and their components.

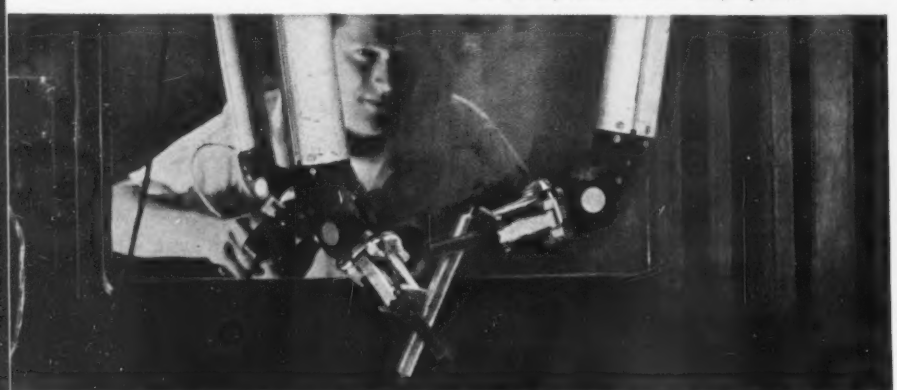


Dr. James H. Wright, shown here with an organic moderated fluidized bed reactor model, is also doing important development work on the concept of an integral boiling and superheat reactor (IBSHR).

Westinghouse Engineers, after design, follow through on construction of reactor plants such as this 5,000 kilowatt plant being built at Saxton, Pa., for the Saxton Experimental Corporation. This new reactor will be used with an existing turbine generator at the Pennsylvania Electric Company site.

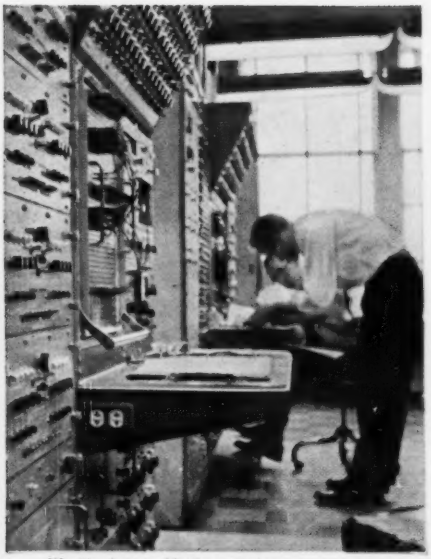


Critical Experiment Station at Testing Reactor. This technician is working in the low power test facility used to confirm physics calculations by experiments before exposure in the reactor.



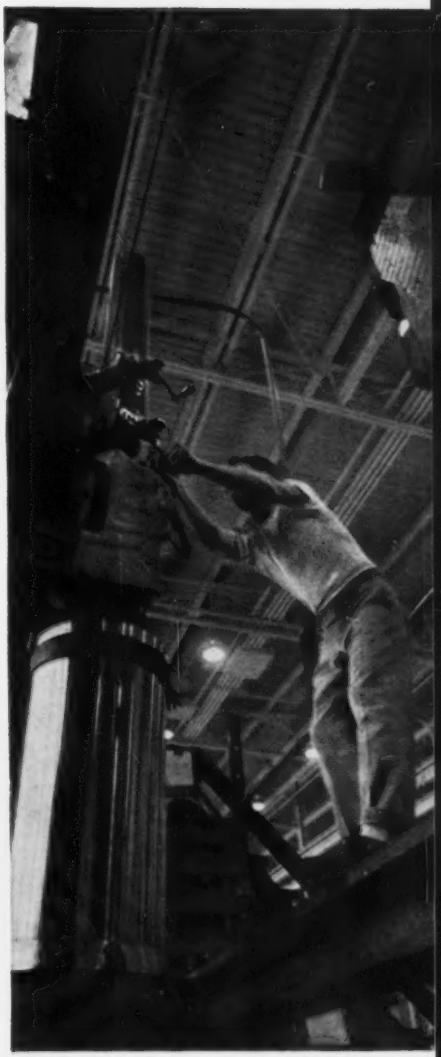
Westinghouse Testing Reactor facility includes hot cells and metallographic cells for post-irradiation examination of samples. Nuclear fuels and other materials can be tested inside cylindrical fuel elements of reactor core. Chemical, analytical and counting laboratories are used for post-irradiation tests.

JI-59503



Westinghouse Mathematicians are working out the solution to a nuclear fuel problem at this computer installation in the Atomic Power Department at Forest Hills, Pa.

Dr. W. E. Shoupp, Technical Director of the Atomic Power Department, plays vital role in developing atomic fueled plants to the point where they will be economically competitive with fossil fueled plants in the generation of electric power.



Skilled Machinist is working on the shell and flange for a canned motor pump on a 120" vertical boring mill at the Atomic Equipment Department.

Dr. Joseph C. Danko heads up promising advanced research of the thermoelectric reactor, a potential means of generating electricity directly from fission heat without a turbine-generator unit.

Fuel Assembly Operation at the Atomic Power Department, where facilities are maintained for development of advanced fuel concepts. Technician is working on cage of a fuel assembly.

Dr. Sidney Krasik, Technical Director of Astronuclear Laboratory, works on applications of atomic power in outer space, such as nuclear power propulsion, the nuclear ram jet and auxiliary power plants for space vehicles.

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Westinghouse

Westinghouse Electric Corporation
Box 868, Pittsburgh 30, Pa.

Their future is in sight

PROTECT IT WITH PROPER SCHOOL LIGHTING

Good school lighting is an essential part of children's "learning environment" — to reduce eye fatigue, aid impaired vision and provide the proper setting for study. If classroom lighting is too dim, too bright, or has too much contrast, it is not the *right* light for young eyes.

Poor lighting can be corrected more easily than poor vision! PG&E offers qualified consultants at no cost to assist schools in lighting problems. And for a free information booklet on proper school lighting, write . . .

NORTHERN CALIFORNIA ELECTRICAL BUREAU

1355 Market St., San Francisco 3

this message is sponsored by Pacific Gas and Electric Company

WATER FORECAST

Continued from page 72

ages in the state will have to rely on streamflow for the bulk of their water.

As of April 1, the outlook is for limited or local water shortage in many areas of the state. Shortages could be severe if April snowfall is extremely deficient.

Idaho – Following a pattern of the previous two years the water supply outlook is good in the northern part of the state, adequate along the main stem of the Snake River, and critically short on tributaries to the Snake River in the southern part of the state. Reservoir storage on the Snake River itself can make up for only a moderate runoff. During March snowfall at higher elevations gained slightly in relation to normal.

For the third year in succession, there will be severe shortages on the Big and Little Wood, Big and Little Lost, Teton, Blackfoot, Malad, Portneuf and Raft Rivers, and Medicine Lodge, Birch and Salmon Falls Creek, and the inflow to Oakley reservoir.

Montana—Water supply outlook for the next irrigation season is poor in the Missouri Basin and fair to good in the Columbia Basin of Montana. Some irrigation water shortages, especially in late season, can be expected for Beaverhead and Ruby Rivers, the Clark Fork and Rock Creek tributaries to the Yellowstone, and along the Musselshell River. A fair water supply is in prospect for irrigated areas served by the Madison and Gallatin Rivers, and the Sun, Teton and Marias Rivers in the north.

The flow of the Missouri and Yellowstone will be about two-thirds of normal near the mountains, but flows will decrease downstream with inflows to Garrison reservoir in western North Dakota forecast at slightly over one-half of normal for the April-September period.

The flow of the Columbia River tributaries is expected to be normal or slightly less with the exception of Clark Fork above the junction with the Flathead.

Irrigation storage is generally below average and less than a year ago.

Nevada – This coming spring and summer will be one of the poorest irrigation seasons of record. Most Nevada streams are forecast to flow 45 to 50% of average during April-July. Irrigation reservoirs are seriously depleted, holding on April 1 only 21% of capacity and 31% of the 1943-57 average.

Mountain snowpack is about 60% of average, except for the Ruby Mountain area which is slightly above normal.

Irrigation season water supplies forecast as of April 1, assuming normal spring precipitation, range from a low of April-July of 13% average for Carson River at Fort Churchill to a high of 70% of average for Lamoille Creek near Lamoille. Near record flow is forecast during April-July for streams heading on the eastern slopes of the Sierra Mountains from the Walker River on the south to the Truckee River on the north.

This will be the third year of much below normal runoff in this area. Allotments of irrigation water are only a small fraction of average.

New Mexico – Streamflow on the Rio Grande in New Mexico will be deficient this year, especially in middle and lower areas. Current forecast for Otowi is 71% of the 1943-57 average. Rio Grande at San Marcial is being forecast at only 55% of normal.

March snowfall was quite heavy at the lower elevations, but not quite up to normal in the mountains. Soil moisture is good on the plains area and near normal in the mountains. Reservoir storage is below average.

The Pecos and the Canadian drainages are expected to flow better than normal. All the reservoirs are full and running over. A good irrigation season is assured.

Flow of the San Juan River will be less than average. The snowpack doubled during March but is still below normal.

Oregon—With near record snowfall during March, water supply outlook in western Oregon has improved materially from earlier in the season. Forecast for streams in the western part of the state now range from 70 to 85% of normal, 5 to 20% above those for March 1. For these areas the water supply outlook is fair to average. Snowfall has not been adequate to improve materially the extremely short water supplies in prospect for such areas as Crooked River, Ochoco Creek, Lost River, Gerber Reservoir, Drew Creek and reservoirs near Lakeview, Silvies River and Silver Creek in the Harney Basin and the Malheur and Owyhee Rivers of eastern and southeastern Oregon. Reservoir storage is slightly below normal for the state.

Utah—One of the driest irrigation seasons for 25 years is in prospect for Utah this next season. The flow of most streams, including the larger and more important, is expected to be near one-half of normal. Specific forecasts for streamflow outside of this range are for 80% of normal for the East Fork Sevier River, Escalante River, Parowan and Salina Creeks, and the streams near Toole. The most extreme shortages, with streamflow 25 to 40% of normal, are for the main stem of the Bear River near Woodruff, Chalk Creek at Coalville, East Canyon near Morgan, and Hobble Creek near Springville.

Higher elevation streams near Salt Lake City, Farmington and Beaver, as well as streams in the eastern part of the Uintah Basin, will have flows near three-quarters of normal.

Reservoir storage is only 50% of normal, excluding Bear Lake. The effects of low runoff will be most severe along low elevation streams and in areas where reservoir storage has been depleted over the past two dry years.

Washington—The water supply outlook for the State of Washington is generally good for 1961. Forecasts of expected runoff are all for flows near normal during the April-September period.

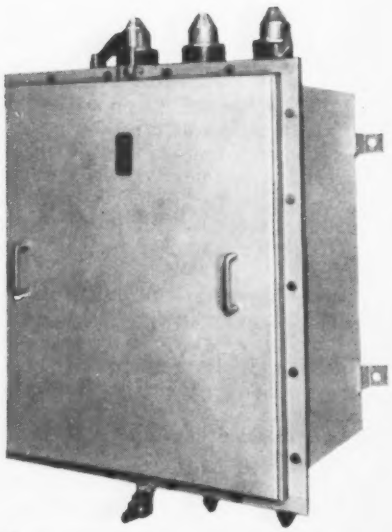
Snow cover increased during March to above normal over all of the areas of the state at the higher elevations. Lower elevation courses are mostly bare. Precipitation during the fall was generally above normal with the exception of the Okanogan drainage. During the early winter this condition continued with the northeastern and southeastern sections of the state as well as the Okanogan, receiving below normal amounts of rainfall. During March precipitation in the southeastern area was nearly twice normal.

Reservoirs used for irrigation in the state have generally more water in storage than normal for this time of year.

Wyoming – Agricultural, power, industrial and municipal water users are facing a water shortage. The April 1 high elevation snowpack indicates that snowmelt runoff will be inadequate for the ensuing summer season.

In addition, reservoir storage is also far below normal for this time of year. Storage for the North Platte irrigated areas is the lowest in 20 years. Storage and prospective streamflow will not meet normal demands. During the next month extremely heavy snow storms will be necessary to materially improve the water supply outlook.

Who ever heard of hanging 500,000 kva on a wall?



▲
Submersible style for use in basements or vaults where flooding is a possibility.

▶
Indoor-outdoor style for general application where there is no possibility of flooding.

Do it with S&C's new line of high-voltage metalclad fuses for wall mounting

Here is a steel-enclosed fuse that gives you economical and fully adequate high-voltage fault protection for small loads:

1. *At service entrances;*
2. *On transformer primaries;*
3. *At underground sectionalizing points.*

S&C's new line of metalclad fuses combines economy with high fault interrupting capability. Their compactness permits wall mounting, eliminating the floor area requirements of conventional free standing metalclad switchgear. And much less room height is needed.

These fuses are especially suited to applications that justify fault protection *only*—applications where infrequent load switching (and isolation for rare fuse replacement) may be done elsewhere.

To permit you to tailor the new S&C Metalclad Fuse—Type SM to your particular requirements, a complete selection of features and ratings is available:

- Indoor Style, Indoor-Outdoor Style, or Submersible Style
- 4.8 kv or 14.4 kv
- 200E or 400E continuous amperes
- Cable entrance by knockout, flange-mounted pothead (1/C or 3/C), or integral pothead (1/C)
- 45,000 kva to 500,000 kva fault interrupting, in convenient steps

For further information, call your nearest S&C Sales Office. Consult the Yellow Pages under "Electrical Equipment" for the telephone number and address in all principal cities.

S&C ELECTRIC COMPANY

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Specialists in High Voltage Circuit Interruption since 1911

S&C

MANUFACTURERS AND DISTRIBUTORS

Price Changes

Effective March 27 Line Material Industries increased published prices of capacitor units and equipment. As an example, price of 50-kvar units is now $117.

Allis-Chalmers has announced new prices for large power transformers. The company reported that present-day costs require a higher price level to bring satisfactory return on sales and to permit continuation of supplying quality products.

Price adjustments on dry-type and liquid-filled instrument transformers were announced by General Electric's meter department. Discounts on dry-type units have been increased 1% as a result of improved efficiency, extensive automation and new manufacturing methods. On the lower volume and less automated liquid-filled units, discounts have been reduced 1% as a result of increased manufacturing and labor costs.

The Republic Appliance Division of Beverly Hills announced across-the-board price increase of approximately 20%, effective March 25, on its electric and gas water heaters. Milton J. Stevens, board chairman of Republic-Transcon Industries, said that the increase was to halt the downward price spiral that is destroying everyone and threatening the very existence of large and small producers alike.

RT&E raised prices approximately 2.7%, effective April 1, on 15 37.5- and 75-kva distribution transformers.

I-T-E Circuit Breaker recently announced that it was recasting its business into a "holding operation" until heavy equipment prices rise to reasonable levels. According to a company spokesman, for the time being, I-T-E will generally not quote low prices to capture new customers or to win sealed-bid business. It will concentrate instead on holding on to old customers, and repeat business. It will also place more emphasis on lighter lines where it can make a profit.

► **Al Tracy,** after a short sojourn in San Francisco, as sales manager for the Western Region, **Anaconda Wire & Cable Co.,** has returned to Los Angeles to become district manager of the company. He will continue to coordinate the five districts in the Western Region. **A. H. Leader,** it was announced, will become sales manager of the **Sequoia Wire & Cable Co.** at Redwood City, where he supervises sales of this Anaconda subsidiary.

► The **Industrial Electrification Council** has released its **Industrial Power Distribution Course** for sale to electric utilities, leagues and other groups. Primary purpose is to train industrial plant personnel in selection of electrical systems and components. Designed for presentation in 10 2½-hour demonstration-type lectures, the course is sold in kit form at $400 fob New York. This is the first program to be released by the Industrial Electrification Council since its co-sponsorship by EEI and NEMA, effective Jan. 1.

► **A. F. McAlister,** former engineering executive for California industrial firms, has joined **Rundel Electric Co.** at Millbrae, Calif.

► **Aluminum Co. of Canada** will shut down its Kitimat smelter in mid-June for five to eight weeks to permit a $1,000,000 repair job to its Kemano tunnel. The smelter has been operating at its rated capacity of 192,000 tons of aluminum per year and inventories are adequate to continue supply to customers. About 2,000 workers will be laid off during repairs, which are necessitated by an obstruction in passage believed to be caused by fallen rock.

► **Alton W. Beck,** vice president, marketing, **Robertshaw-Fulton Controls Co.,** at the company's Richmond, Va., headquarters, has been transferred to the West Coast as vice president, Western Operations. His headquarters will be in the company's offices in Anaheim, Calif.

► **Richard B. Barton** has been appointed district manager, Installation & Service Engineering Department, for General Electric's Pacific Southwest District. He succeeds **Philip L. Savage,** who has been appointed consultant to the district manager, a post that he will hold until his retirement sometime in April. Barton will continue as acting manager of I&SE for turbines with headquarters in Los Angeles.

► **Al Micheli Jr.** is new manager of the Honolulu branch office of Don H. Burcham Co., manufacturers' representative. He replaces **Boyd Christopherson,** who resigned from the Portland-based firm.

TEST PROGRAM: Most effective corona-RIV control methods for 345-kv transmission were demonstrated in a two-day program held by Lapp Insulator Co. at the John Lapp High Voltage Laboratory in Le Roy, N. Y. Amnog some 70 electrical engineers attending was Bill Hanson, Arizona Public Service Co., shown center, with John Innes, Lapp sales manager, and Martin MacDonald of Earl S. Condon Co., Los Angeles. Also participating but not in the picture was P. L. Bellaschi, Portland consulting electrical engineer

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► **Hugh C. Blair,** since 1959 manager, industrial sales, for Allis-Chalmers in New Orleans district, has been transferred to Phoenix as district manager there.

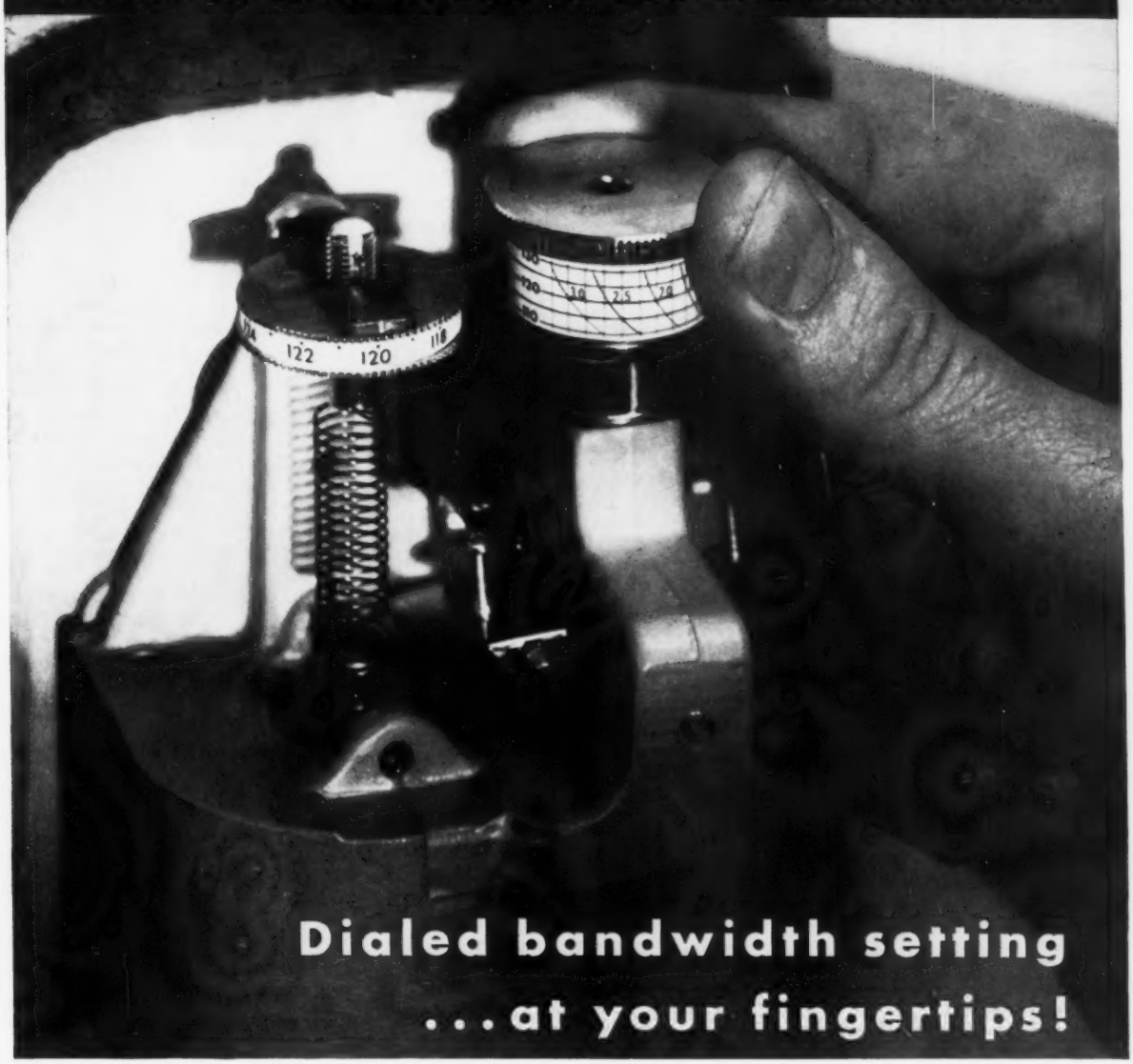
► Ervin H. Unvert and Richard Johnson have formed a new manufacturers' agents business known as **Pacific Southwest Sales Co.** at 750 S. Kohler St., Los Angeles 21. Unvert was formerly with Edwards Co. Inc. The firm represents Miller lighting fixtures, Power Strut Division of Van Huffel Products Inc. and Sperti-Faraday signaling devices.

► **Howell Electric Co.** has moved to 6058 College Ave. in Oakland. The firm does industrial, commercial and residential wiring and repair.

► Following the death of George Wilson, pioneer electrical contractor-dealer, proprietor of **Lighthouse Electric Co.,** Ogden, the business has been taken over by **John E. Elggren,** who had been with Mr. Wilson prior to his death.

► **Paul H. Zeanah** has been made manager of operations G-E's boiling water reactor at Vallecitos Atomic Laboratory in Pleasanton, Calif. He succeeds **Dr. Ralph D. Bennett,** manager of the laboratory since it was established in 1956.

ANOTHER STEP AHEAD IN VOLTAGE REGULATION



Dialed bandwidth setting ...at your fingertips!

New, exclusive G-E Micro-Band* relay permits fast, accurate setting of both regulator voltage level and bandwidth

Now, with General Electric single- and three-phase step voltage regulators, you can dial optimum voltage level *and* bandwidth *in seconds . . . with micrometer accuracy!*

This important new advantage results from G.E.'s exclusive Micro-Band voltage-regulating relay—the first in the industry to offer you a dialed calibration of *both* these vital adjustments.

Micro-Band relay saves you time and money by eliminating the guesswork and painstaking procedures normally involved in making regulator adjustments. What's more, this *full* calibration permits precise coordination of voltage level and bandwidth setting with General Electric's highly flexible time-delay control. Thus, you take full advantage of the reduced bandwidths possible with General Electric regulators—bandwidths proven by recent computer studies to offer you increased system earnings at no sacrifice of regulator life.

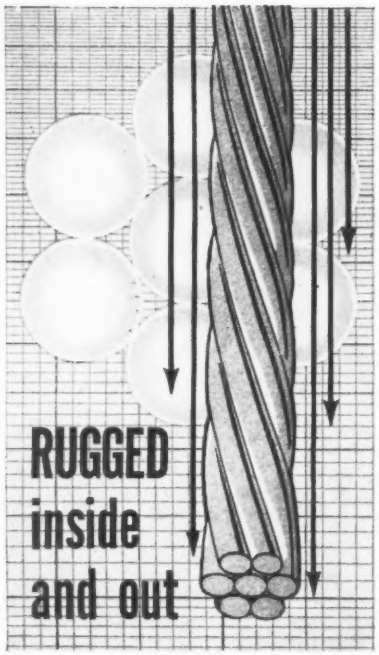
Your General Electric regulator representative has complete information on the new Micro-Band relay and can show you how to achieve system savings through reduced regulator bandwidths. Call him today. Or write General Electric Company, Section 456-08, Schenectady 5, N. Y. *Voltage Regulator Products Section, Pittsfield, Mass.*

* Trade-mark of General Electric Co.

Progress Is Our Most Important Product

GENERAL ELECTRIC

For phone number of closest representative see advertising index in back of book.



Crapo
GALVANIZED
STEEL STRAND

Ruggedness and reliability are built into **Crapo** Galvanized Steel Strand from start to finish. The selected steel is carefully processed to make the final product strong and ductile—easy to handle, work and serve. The time-proved, tightly-bonded, tough zinc coatings resist the abuse encountered in construction and provide lasting protection against corrosion.

Crapo Galvanized Steel Strand is economical, too, both in first cost and ultimate cost.

A B C

CHOOSE FROM 3 COATING WEIGHTS

A coating weight for every need—**Crapo** Galvanized Steel Strand is readily available in Class A, B and C weights of coating. Class B coating is twice as heavy as the standard Class A coating; Class C coating is three times as heavy.

Contact the distributor of **Crapo** Galvanized Steel Strand near you for complete information!

INDIANA
Steel & Wire Co., Inc.
Muncie, Indiana

► Establishment of a district sales office in Phoenix to handle sales of data processing computers in the Arizona-New Mexico area has been announced by General Electric's Computer Department. **James M. Wyllie** will be district sales manager with offices in the Guaranty Bank Building, 3550 N. Central Ave.

► **Sydney Anderson** has been appointed vice president in charge of West Coast operations for **Typhoon Air Conditioning Division** of Hupp Corp. With headquarters in the Los Angeles factory branch, he will supervise operations in California, Arizona and Nevada. Before joining Typhoon, he was Los Angeles branch manager for Airtemp Division of Chrysler Corp. He also served as general manager of packaged air conditioning products for Airtemp in Dayton, Ohio, and was regional manager in Atlanta, Ga.

Anderson

► **J. B. Williams** Co., maker of pharmaceuticals and toiletries, has made a cash offer for the stock of **Landers, Frary & Clark,** electric housewares manufacturer. The offer (at $22 to $23.50 a share) will be effective if holders of at least 80% of the outstanding Landers stock agree to terms before May 4.

► **Mel Templett,** formerly district manager for National Electric Products Corp. in Phoenix, has been appointed sales representative for Wheatland Electric Products Co. and will represent that company in New Mexico, Arizona and El Paso, Texas. His headquarters will be in Phoenix.

► **Bernard C. West,** for some years with Federal Pacific Electric Co. in the Northwest and San Francisco Bay region, is now vice president of Mears Electric Controls Co., Portland, Ore.

► **Halo Lighting Products** has moved its West Coast sales offices and warehouse to 1044 Richmond St., Los Angeles.

► **Maddox Sales** Co. of Los Angeles is now representing the **Steelduct** Co. in the State of Arizona; Las Vegas, Nev.; and parts of California. The company's address is 914 E. Third St., Los Angeles 13.

Lawler

Prussia

► **Electrical Fittings** Corp. has made a major policy change in marketing of Efcor products in the southern California territory with the opening of its first factory controlled and staffed redistribution warehouse in Los Angeles. The new warehouse is centrally located at 822 E. Third St. **Bob Prussia,** associated with Efcor for some 18 years, is Western district manager. **Chuck Lawler** has been added to the staff to assist him. Change of policy from agency representation to factory operation was announced by Richard W. Noel, vice president.

► **John E. Jones** has been made Northwest District manager for **Edwards** Co. with headquarters in San Francisco. He will be responsible for sales in Oregon, Washington, Alaska, Montana, Idaho, Utah, Nevada and parts of California. Before joining Edwards, he was on the marketing staff of G-E's Hotpoint Division.

Jones

► **Allis-Chalmers** will furnish the heart of a klystron tube testing operation at **Eitel-McCullough** Inc., San Carlos, Calif. Included are two DJ switchgear cubicles with a two-cycle breaker and a 2,500-kv step-type voltage regulator to provide regulation from 0 to 110% voltage in very fine steps. The application is said to give the firm the fastest available circuit breaker to protect the rectifier equipment. Very high frequency klystron tubes are used in pulse-type transmission.

► **Pittsburgh Standard Conduit** Co. has acquired assets of the **Houston Plastic Bonding** Co. of Houston, Tex., which specializes in application of heavy plastic coating to electrical conduits and fittings for areas with severe corrosive atmospheres. The Houston company will be known as Plasti-Bond, a division of Pittsburgh Standard.

► **D. B. Eardley** has been made manager of Graybar's Northwestern District with headquarters at Seattle. He had been serving since last July as district sales manager there. Eardley joined Graybar in 1937 and has been at San Francisco and Fresno. He has been with the company for his entire career except for three years' leave of absence to serve with the Navy.

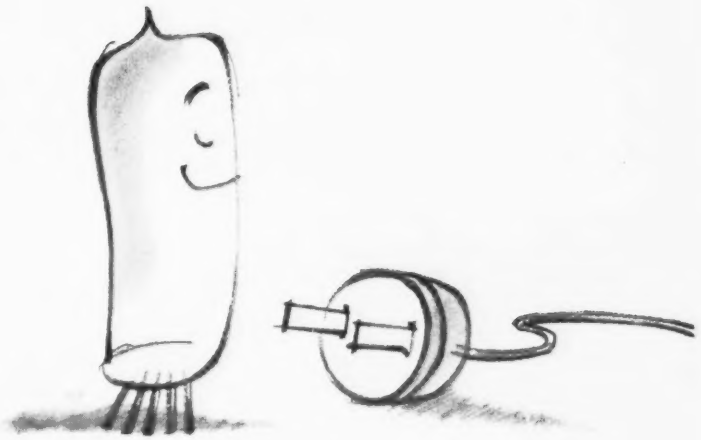
Eardley

► **Bradford J. Stimpson** has been promoted to marketing manager, power circuit breakers and power switching equipment, for Federal Pacific Electric Co., with headquarters at Santa Clara, Calif. He started with the firm in 1947 as an inside salesman, then became a utility salesman in the Seattle office. In 1955 he was made Los Angeles assistant district sales manager and in 1958 became utility sales manager. Before his recent appointment he was assistant marketing manager, circuit breakers and power switching equipment. A native Californian, Stimpson was graduated with honors from the University of California with a degree in electrical engineering. During World War II he was an officer in the OSS assigned to the Far East and China.

Stimpson

► The Matzinger-Johnson Co., representing electrical manufacturers in southern California, Nevada and Arizona, announces the appointment of **Paul V. Winkler** as field sales engineer. Winkler has been associated with the electrical industry in California and Arizona for the past 12 years. He has a background of utility and sales engineering experience, having worked for Montana Power Co., PG and E, Line Material Industries, and most recently the Delta-Star Electrical Division, H. K. Porter Co.

Winkler



"being electrical's all right

– but *I'm* electronic"

Specialization is a great thing to get the right talents where they can do the most good. It's a good thing some people want to be mayors and some others would just as soon collect garbage.

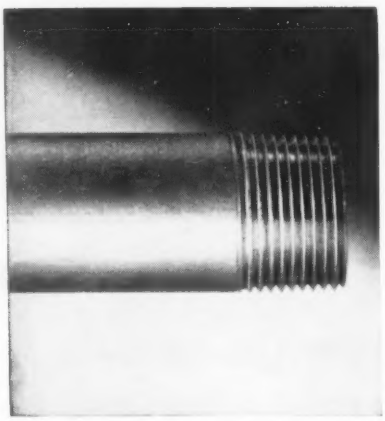
But pride in your specialty can go to amusing extremes sometimes — like people in the "New Frontier" industries convincing themselves that their plateau is a little higher than anyone else's. Maybe it's only because there's more initial glamor associated with the new problems than the old familiar ones.

The E.E.'s at Fisher-Pierce work on both "electrical" and "electronic" jobs for every utility customer we have. They seem to rationalize things on the basis of whether it's milliwatts or kilowatts, Ohm's Law and plain figgerin' still pull out the answers. Got any hot new problems you'd like us to work on (electrical or that other kind)? Fisher-Pierce Division, Sigma Instruments, Inc., 43 Pearl St., So. Braintree 85, Massachusetts.

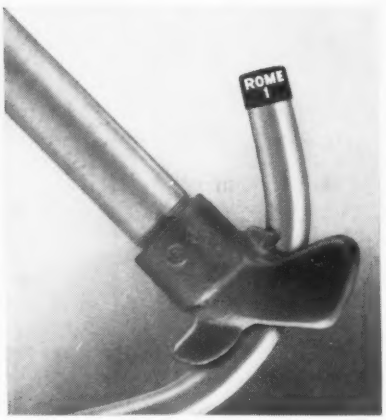
FP

FISHER PIERCE

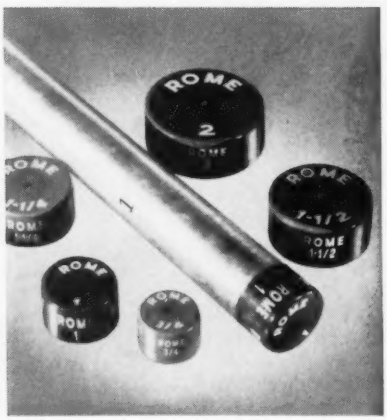
6 ways you benefit when you install ROME RIGID STEEL CONDUIT



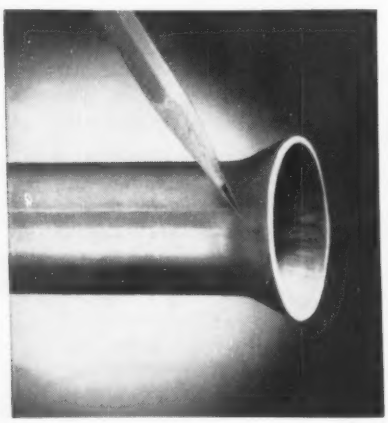
EASY CONNECTING. Rome rigid steel conduit exclusively is **hot dip** zinc-coated by the Sendzimir process after threading. Threads are clean, sharp.



EASY BENDING. Uniformity of the conduit wall, due to **controlled annealing** before galvanizing, makes Rome conduit easy to bend accurately.

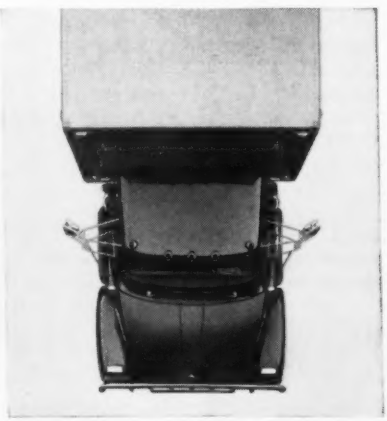


EASY SIZE IDENTIFICATION. Each length is identified by color-coded, size-imprinted thread protectors . . . and, in addition, the size is imprinted on the tube itself.



UNBREAKABLE WELD. Uniform edges, bonded by electrical resistance welding, form a weld stronger than the pipe itself.

EASY HANDLING. Conduit is shipped in one-ton bundles, subdivided into smaller bundles for easy handling on the job site.



CONVENIENT DELIVERY. Fast, efficient shipment to the job site from your nearby Rome Cable electrical distributor.

For more information on Rome rigid steel conduit, write for Bulletin RCP-940, or ask for a sample. Rome Cable Division of Alcoa, Dept. 4-51, Torrance, Calif.

ALCOA
ROME CABLE
DIVISION

For phone number of closest representative see advertising index in back of book.

ELECTRICAL WEST
MAY 1961

CONTRACTING & CONSTRUCTION SECTION

STATISTICS / COSTS / PROPOSED PROJECTS / NEW PRODUCTS / NEWS

LATE NEWS FLASHES

Union Opposes Federal Power Line

Taking issue with Utah's Representative David S. King, who had requested federal funds for the building of transmission lines from Vernal to Provo and Heber to bring power from Flaming Gorge project, V. G. Pearson, business manager, Local 57, IBEW, issued a strong protest. He cited that these lines would be built with nonunion labor from outside Utah, that there were lines already built by private power companies employing union men and by contractors who use local union labor, and the duplicating lines would be waste of taxpayer money as well as a threat to his membership.

Seattle Contractors Face Council for City Work

Puget Sound Chapter, NECA, took to the city council of Seattle its request that more of the outside construction being done by City Light crews be put out to contract. Maynard Sundt, manager, sought answers, without success, to questions as to the size of the City Light labor force, the value of its construction and maintenance work, what equipment it had. John Nelson, executive superintendent of City Light, declared that an average of $1,250,000 yearly is let out by contract but insisted some jobs do not lend themselves to contracting. John Starcevich, assistant business manager of Local 77, IBEW, urged the council not to contract work that would lose jobs for City Light union employees. The council told contractors to submit any money-saving ideas.

► **Hugo Becker** of Wismer & Becker, Sacramento, chairman of the NECA public relations committee for District 9, president of the Sacramento Valley Chapter, missed the Tri-District conference by making a trip to Russia with a group of Sacramento businessmen.

Continued on page 101

Page 92 — NEW PRODUCTS
ESTIMATOR'S GUIDE
102 — PROPOSED WESTERN PROJECTS
100 — READER SERVICE SECTION

Motors and Controls—XXII

NOW FOR A COORDINATED SYSTEM

TOM HUGHES, CALIFORNIA DEPARTMENT OF INDUSTRIAL SAFETY

We have spent a lot of text showing why we call the currently popular three-phase motor protective devices noncoordinated. They are coordinated with the current flowing in the primary motor leads – and only the current. When you consider all the variables at the motor that are not reflected in current flow in an individual phase wire their use is a little bit analogous to using a stethoscope on a man's leg to find out what is going on in his heart.

But, before we go further: please don't jump to the conclusion that we are proposing the complete abandonment of their use. The purpose of this series is to obtain a more considerate and enlightened approach in applying motors and their controls. There is a good and proper use for each type of control and this portion of the series is aimed at the solution of previously unsolvable problems in application.

So we will talk about coordinated protective systems now, if you please. Since protecting is hinged on sensing the **need** for protection, we want actually to sense the heat that is causing the trouble in the presently mistreated motor—the motor that is being treated like a rodeo pony.

Two types of devices are presently available and are being applied. One is a tiny thermostat and the other is a recent product of the electronic industry, the thermistor. The thermostat activates self-contained contacts to open or close a control circuit in which it is inserted. The thermistor is a semiconductor with a resistance characteristic that varies as its temperature is varied. The variable resistance is inserted in a direct-current circuit either to operate a sensitive relay or upset an over-all balance in circuit resistance.

While the thermostats can be purchased (with various operating characteristics and ratings) from the Texas Instrument Co. and taped or laced to the windings of existing motors by anyone, he is on his own as to the results obtained. These devices are usually incorporated in new windings by motor manufacturers, on special order. By experience acquired from previous tests, they can fairly well predict the results for any motor types to which these would be properly applied.

Use of the thermistor is limited to application by motor manufacturers. Since the thermistor can only be utilized as a link in a special control system the proper correlating and application of the elements in the system are best controlled by an organization equipped for such.

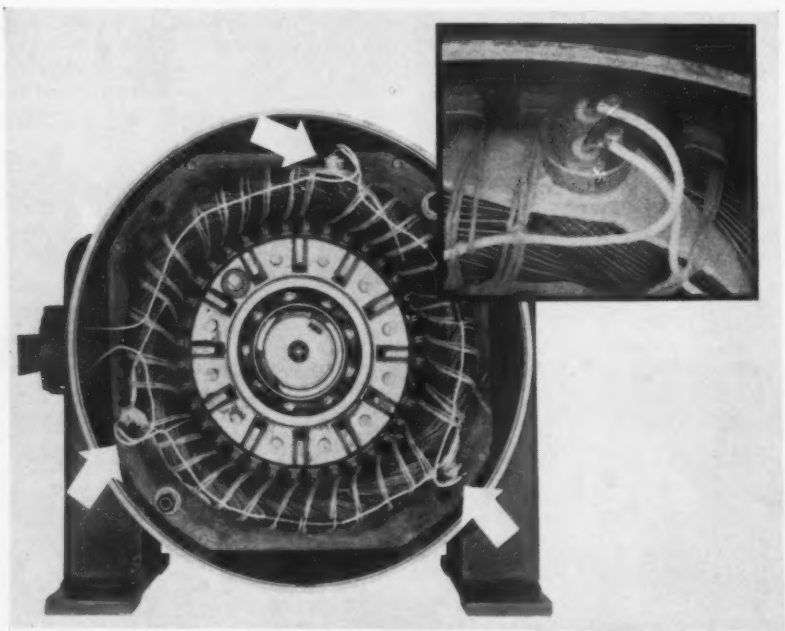
Thermostats have been applied to bearings of large machines for many years and the well known Klixon has been applied coincidentally to the stator current and frame heat of small motors for several years. The Klixon is a form of thermostat but, since it is applied to the frame, it is not fast enough at sensing the winding temperature. Therefore, its bimetallic deflector is usually boosted by a self-contained pilot heating element, which is heated by passing the same motor current that its contacts will interrupt on overload.

The thermistor (name derived from a contraction of thermally influenced resistor) has only existed in its usable state for two or three years and the tiny thermostat developed by Klixon (a subsidiary of Texas Instruments) has not existed much longer. Both of these devices are applied in direct contact with the winding and thus do a better job of sensing hot spots than the original Klixon could do.

Thermistors of different thermal characteristics are available from various manufacturers of semiconductors. They can be used either to indicate unsafe heat or to shut the motor down. Westinghouse has just developed a series of motors with thermistors in the windings which it calls Guardistor motors. It furnishes the complete system of motor and protection ready to be applied to any job.

This company is using a thermistor with a recently developed thermal characteristic. At normal operating temperatures its resistance remains nearly constant. At a critical temperature (which can be varied in its manufacture to suit the needs of different motors) its resistance makes an extreme jump.

The thermal characteristics of



How the Klixon thermostats are applied. Inset shows metal base inserted into the coils

How Circle exceeds the specs to give you...

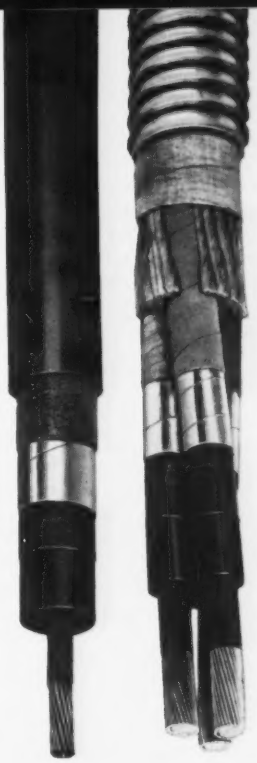
MAXIMUM LONG TERM STABILITY

Most ordinary products generally manage to *meet* specifications. The quality product is recognized by the way it *exceeds* them.

Take, for example, Circlesheath Type RR Power Cable and the important IPCEA-NEMA 60 cycle water absorption test. Requirements call for immersion in water for 14 days with maximum SIC change and stability factor of 5% and 1% respectively.

The table below clearly indicates Circlesheath superiority – not only after 14 days submersion but after *two years and ten months in a test that was originated in September 1958!*

Long term stability is only one of the many ways Circlesheath exceeds specs to give users maximum performance. For complete reliability, specify Circle on your next job – there's no finer power cable made.



CIRCLE WIRE & CABLE CORP.
SUBSIDIARY OF **CERRO CORPORATION**

PLANTS: Maspeth and Hicksville, N. Y. **SALES OFFICES & WAREHOUSES:** In all principal cities.
Rubber Covered Wires & Cables • Varnished Cambric Cables • Plastic Insulated Cables • Neoprene Sheathed Cables • "CIRTUBE" EMT

CABLE DESCRIPTION: 15KV, UNGROUNDED, SHIELDED	CIRCLESHEATH® CHANGE SIC	PERFORMANCE STABILITY FACTOR
700,000CM	4.3%	.6%
300,000CM	3.9%	.5%
300,000CM	3.6%	.4%

most thermistors have made them less critical in their response to the winding temperature and they have usually been augmented with an exterior overcurrent relay of more instantaneous response to protect against locked-rotor or single phasing. The Klixon C 4344 thermostat must also be coordinated with an instantaneous magnetic or suitable thermal relay to clear a sudden emergency at a faster rate than it can operate.

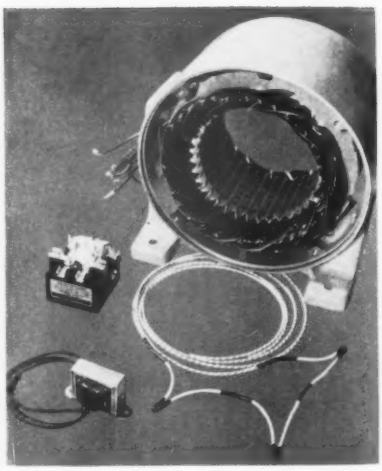
While this little thermostat is laced in direct contact with a motor winding coil end, its operation depends on a tiny bimetallic deflector within its hermetically sealed case. The exterior metal case must pass heat to this element and the element must then be raised to the point of its thermo-mechanical upsetting. So there can be considerable lag when emergency action is required. Care must be used in placing this unit in the winding so that it will be sheltered from cooling by the rotor fan action.

The main virtue of these little thermostats is that any rewind shop or experienced motor repair man can apply them to an existing motor winding. As pointed out before, this may require a little judicious tinkering with all components to get a properly coordinated system. They open self-contained contacts, which can be inserted in any series string of 480-v control circuit devices. The manufacturer can supply them to open at different temperatures and they are, of course, self-reclosing.

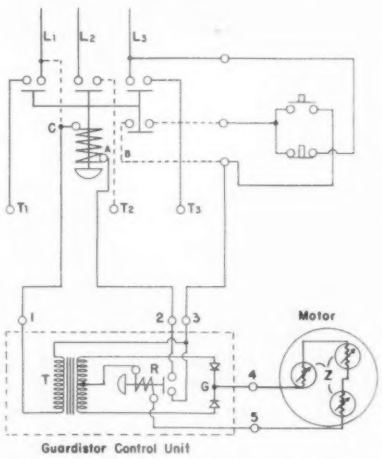
General Electric Co. has developed a new thermostat which it is going to apply to the windings of a series of motors. This thermostat is called Thermo-Tecter and the series of motors is to be called Tri-Clad 55. This signifies that the thermostats are applied to all three phases and the motors are allowed a 55 C rise over ambient before tripping off the line.

The principle of the actuating element is different from the bimetallic element that has been used in relays for many years. Whereas the bimetallic arm or disk has always consisted of a closely mated assembly of two dissimilar metals this relay uses two metals of dissimilar expansion coefficients but they are separated from each other. The one that is nearest to the winding to which it is attached has a greater expansion coefficient.

On a gradual warm up of winding the second or inner metal receives enough heat to keep pace in expansion with the first expander. Thus they trip at the chosen critical running temperature. Any sudden heating from stalled rotor, single phasing, etc., will transmit heat to the outer expanding metal and expand it before the inner metal can keep up. Thus it quickly upsets their balance and trips the motor off the line before a gradual damage can be done.



Parts of Westinghouse thermistor assembly and controls, which are factory installed



Wiring diagram for thermistor installation

Like the Klixon thermostat, these Thermo-Tectors are inserted directly in the normal starter control circuit. And like the Klixon thermostats (if they can be purchased from G-E separately for the motors) they could be applied to the winding of an older motor.

We note two disadvantages to this series of motors as depicted in the sales literature. One is that the pictures show the Thermo-Tectors attached on the outer edge of the periphery of the winding connections instead of nestling in among the actual coil ends. These are the connecting wires that jump over the other two phase groups of a pole and catch the next coil group at another pole. These wires are larger than the coil wires and they are out where they are cooled by the fan impellers. The thermistors are smaller and can be inserted in closer proximity to the actual hot spots.

The other objection we have is to the operation of the motor at a higher temperature. The electrical industry is becoming noted for selling every job down—giving us a poorer and cheaper job—while other industries make us take bigger and more powerful autos, fancier and more expensive hospitals, etc., than we want. This is just another sales feature to cater to the manufacturer who is looking for smaller motors for his appliances or machine tools.

The accompanying drawing shows the normal hookup for application of the Westinghouse Guardistor motors. The portion that is boxed in by the dotted line is the part furnished with the motor. T is a small transformer, R is a sensitive relay, G is two diodes for rectifying the a-c, and Z is the three thermistors inserted in the motor winding.

This group of T, R and G are actually assembled in a unit not much larger than a large door bell. The installer takes a normal motor controller (contactor) without thermal overload relays and breaks the tie between points A and B at the holding coil. He makes the connections as shown at A, B and C, bringing them to the terminals on this small control unit.

The relay R is normally open. When the normal motor control circuit is energized the transformer T passes current through G to the thermistors at Z. At their normal temperature they admit enough current to close R and thus close the motor controller. The raising of any one of these thermistors above its critical temperature inserts enough resistance to prevent the closing of relay R. On the other hand, any malfunction in any portion of the motor control circuit or its own components, that drops the voltage to R, will stop the motor. So it is a fail-safe setup.

So you see, with these different devices we have the basis for what we call coordinated protective systems. Coordinated with the actual heat at the horse's mouth. The factors that produce the heat (either normal or abnormal overheating) make a long list and can vary all over the place but it's still just heat and we are equipped to act on it. No excuse for nuisance tripping here, if the motor is properly applied to the load.

ADVANCE®

First with these major contributions to the lighting industry . . . . and NOW

Utilizing a special thermo-pliable compound that absorbs the vibration of core and coil before it becomes sound.

Up to 15% more light output, operate 15° to 20° cooler, increase ballast life 3½ to 4 times.

Thermally protected to safeguard against failure from excessive temperatures, current, voltage and end-of-life hazards.

DRIP-FREE Unitized Construction

Through continuing development by the Research and Engineering Divisions, Advance Transformer Co. offers the lighting industry an innovation in Fluorescent Lamp Ballast Design. A design incorporating the principle of ***Unitized Ballast Construction*** . . . ballast housing, core and coil, capacitor and the new Advance **"SOLID-FIL"** development combine to offer ***Drip-Free Unitized Construction***. This exclusive Advance development differs from other types of solid fill materials in that it retains a pliable consistency, and will not become brittle with age or heat, permitting retention of its excellent thermal and sound deadening characteristics. Accelerated heat tests, far above what will be experienced in an actual lighting installation, **proved conclusively no deterioration or drippage** of the Advance **"SOLID-FIL"** development.

Advance Improved **"SOLID-FIL"** Fluorescent Lamp Ballasts dissipate heat faster, provide greater safety, and offer the lighting industry the opportunity to utilize a quieter operating solid fill ballast. Ask your Advance representative or write for further details.

- **DRIP-FREE**
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- **MORE EFFICIENT HEAT DISSIPATION**
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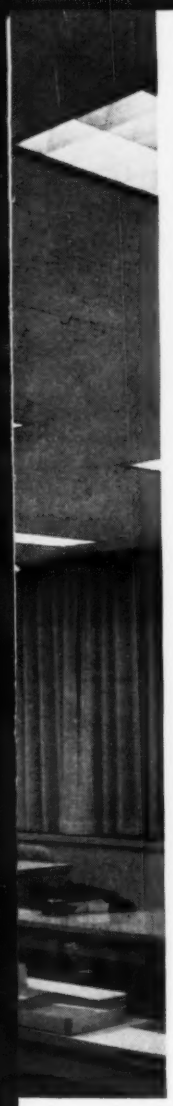
For phone number of closest representative see advertising index in back of book.

Day-Brite PARAFLO® Troffers with patented PARALOUVERS® simplify ceiling appearance and planning by eliminating the need for separate air diffusers . . . deliver 100 footcandles with a minimum of glare. PARAFLO Patent Nos. 2,845,854 · 2,845,855 · 572,565 · 575,897 PARALOUVER Patent Nos. 26,833,799 · 507,541

Sleek fixture appearance complements modern wall treatment throughout building.

Pure Oil Company Building, Palatine, Illinois
Architect: *Perkins & Wills;* Electrical Contractor: *Kelso Burnett Co.*



Who goofed and forgot the air diffusers?

Nobody goofed.

In fact, very *special* attention was given to assure Pure Oil Co. employees the finest in year 'round comfort. Day-Brite combination lighting-air diffusing fixtures deliver lighting, cooling, heating and ventilation — all through the same outlet.

The result is an attractive, efficient working environment with...

High-level, low-glare Day-Brite lighting for better vision;

More uniform air distribution, thanks to the many diffusing sources;

And clean, uncluttered ceiling appearance.

A full year was spent pre-testing these Day-Brite fixtures from every possible angle, including ease of installation and maintenance. Now in operation, Pure Oil Co. engineers report "complete satisfaction!"

For more information on how Day-Brite combination lighting-air diffusing fixtures can simplify your next ceiling plan, contact your Day-Brite representative listed in the Yellow Pages or write *Day-Brite Lighting, Inc., 6260 N. Broadway, St. Louis, Mo., and Santa Clara, Calif. In Canada: Amalgamated Electric Corp., Ltd., Toronto 6, Ont.*

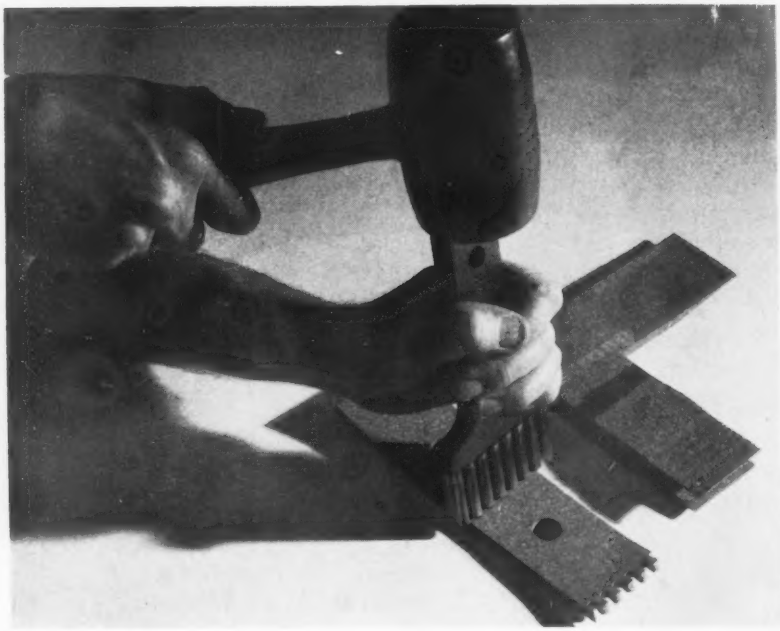
Write for FREE booklet on **Comfort Conditioning with Light and Air**: Day-Brite Lighting, Inc., 6260 N. Broadway, St. Louis 15, Mo.

DAY-BRITE

NATION'S LARGEST MANUFACTURER OF COMMERCIAL AND INDUSTRIAL LIGHTING EQUIPMENT

PRODUCT NEWS

New designs and applications



Gasket Cutter

Westinghouse Electric Corp.

A hand-type gasket cutter that permits field fabrication of interlocking joints for power transformers has been announced by this company. The gasket cutter can be used for making joints in gaskets from ¾ to 3 in. wide and up to ½ in. thick.

Circle No. 1

Hydraulic Pump

Greenlee Tool Co.

A new miniature size, portable two-speed hydraulic power pump weighing 14 lb, and capable of developing pressures up to 10,000 psi, has been announced by this company. It is reported as a dependable source of power for electricians' hydraulic knockout punch drivers, rams, jacks, pullers and other tools or hydraulic systems where high-pressure, low-volume requirements are similar.

Circle No. 2

New Color Cover

General Electric Co.

New pearl-grey Melalast covers, which replace the traditional blue-grey colors on all pole-mounted distribution transformers with high-voltage ratings above 5 kv, have been introduced by General Electric. The new color for covers is now being used on all cover-bushing units, including the new 250-500-kva pole-type units, providing easier identification for covers with Melalast.

Circle No. 3

Air Circuit Breaker

Federal Pacific Electric Co.

A new 1,000,000-kva, 15-kv magnetic air circuit breaker, designated type DST 15-1000, with unusually fast interrupting characteristics, has been introduced by FPE, according to a recent announcement.

This new breaker design is said to incorporate efficient U-H design magnetic arc chutes that maintain a more uniform flux pattern in the interrupting chamber. This type of arc chute construction, combining the features of both the U and the H type, provides the most compact interrupter for its rating. Total interrupting times are less than five cycles from light load to full load interrupting capacity of 42,000 amp.

Circle No. 4

Improved Aluminum Conduit

Kaiser Aluminum & Chemical Corp.

This company is introducing an improved rigid conduit with a new type of interior lubricant, which is said to reduce the effort required in wire pulling by as much as 75%. The coating, known as K-40, has a high silicone content providing a slippery interior surface. The conduit will be sold nationally through electrical distributors.

Circle No. 5

Manhole Access Tub

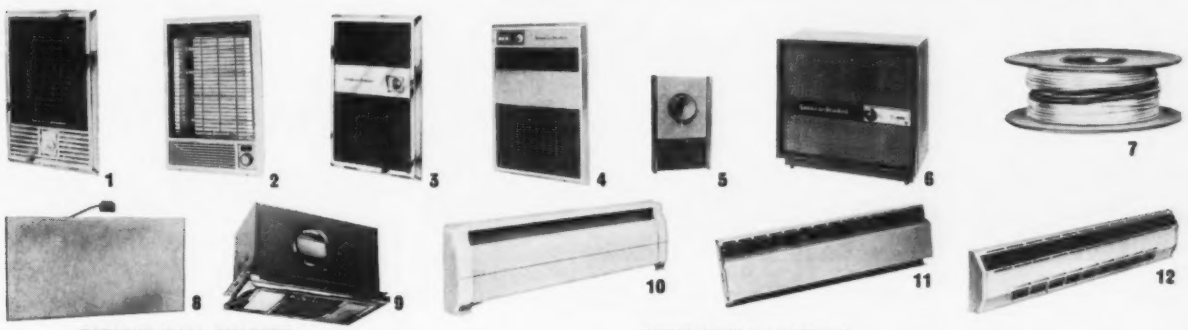
Phoenix Fiberglass Inc.

A fiberglass tub for installation around a manhole to prevent the entrance of surface water has been introduced by this company. The tub has three off-center-type latching hooks that attach to the manhole with an inflatable rubber tube which prevents water from leaking around the perimeter.

Circle No. 6

The exciting trend is to ELECTRIC HEATING—and the HOT LINE is AMERICAN-STANDARD "ELECTRI-WARM"!

"Electri-Warm"—the complete line of quality heating equipment that's priced to compete . . . American-Standard—the name you don't have to sell, you capitalize on . . . put these names together and you have American-Standard "Electri-Warm," the prestige entry in the fast-growing field of electric heating. There are "Electri-Warm" units for ceiling, wall, baseboard, floor—any place and every place you might be called on to install an electric heating unit. And the call for quick, clean, silent, maintenance-free electric heating is growing stronger and stronger all the time. The switch is on! The exciting trend is to electric heating—and the hot line is American-Standard "Electri-Warm"!



RADIANT WALL HEATERS
1. Ribbon Type—120-240 Volt—three sizes
2. Vycor Type—120-240 Volt—four sizes

FAN FORCED WALL HEATERS
3. Standard Type—120-240 Volt—two sizes
4. High Capacity—120-240 Volt—five sizes

CONTROLS
5. Five Thermostats (low and line voltage)

PORTABLES (Fan Forced)
6. 240 Volt—Dual Range—Integral Thermostat—three sizes

CABLE (Ceiling and Floor)
7. 240 Volt—Standard Reel Sizes

CEILING PANEL
8. Printed Circuitry—120 or 240 Volt—500 Watts

CEILING HEATER-LIGHT-EXHAUST-CIRCULATOR
9. Combination Unit—120 Volt—1450 Watts (Heating)

BASEBOARD
10. Economy—240 Volt—Low Density—four sizes
11. Standard—240 Volt—Low Density—four sizes
12. Deluxe—240 Volt—Hi-Density—four sizes

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AIR CONDITIONING DIVISION
ELECTRIC HEATING DEPARTMENT

AMERICAN-STANDARD ELECTRIC HEATING DEPT., 40 W. 40th ST., N. Y. C.
Send me details on selling the "Electri-Warm" electric heating line.
Name.....Position.....
Company.....
(Distributor? Contractor? Other?).....
Address.....
City.....Zone....State.....

Repeat Performance

ROYAL Portable Cords

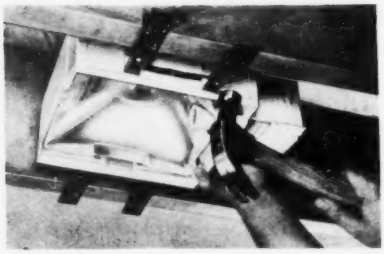
are dependable, easy working, made right to be right on every job, time after time after time. Royal is the BIG line, too . . . rubber, neoprene and thermo-plastic, as well as lamp cords, fixture wires, machine tool wires, thermo cables, bell wires, coaxial cables, and more. All packaged for fast, easy identification. So when you buy wire and cable, specify ROYAL, the line that's preferred by electrical men everywhere. See your wholesaler, or write for catalog, giving wholesaler's name.

ROYAL ELECTRIC

...an associate of

ROYAL ELECTRIC CORPORATION
PAWTUCKET • RHODE ISLAND
In Canada: Royal Electric Company (Quebec) Ltd.
Pointe — Claire, Quebec

SALES REPRESENTATIVES AND WAREHOUSES: Los Angeles—1950 Naomi Avenue, RI 7-9655; San Francisco—1225 Sixth St., HE 1-5792; Seattle—4130 First Ave., So., MA 3-8332; Phoenix—221 E. Camelback, CR 7-1662; Denver—110 Yuma, SH 4-1351

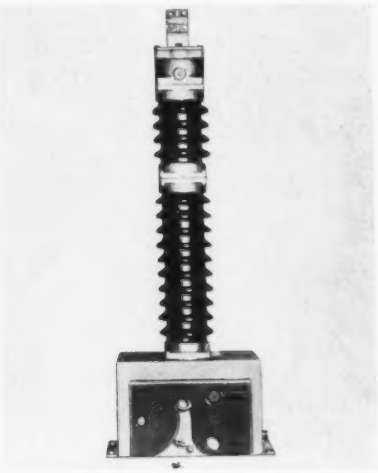


Recessed Lighting Fixture

Residential Lighting Division, Thomas Industries Inc.

A new, prewired, recessed lighting fixture, engineered to enable electricians to make installation at the job site in less time, has been introduced by the Star Light Division of Thomas Industries Inc. The new Star Light X-Press incorporates a number of features, which makes possible its installation in any type of ceiling in a matter of minutes and with a minimum number of tools, according to the manufacturer.

Circle No. 7



Grounding Switch

Line Material Industries

Fast grounding of power system lines can be achieved by this company's new type PGH high-speed grounding switch, according to a recent announcement.

The units are actuated by a relay that senses a low-magnitude fault, such as an internal fault in a transformer. The six-cycle closing of the grounding switch quickly establishes a high-magnitude fault which can be sensed by the relay of a backup circuit breaker. Thus the effective range of a breaker can be extended economically.

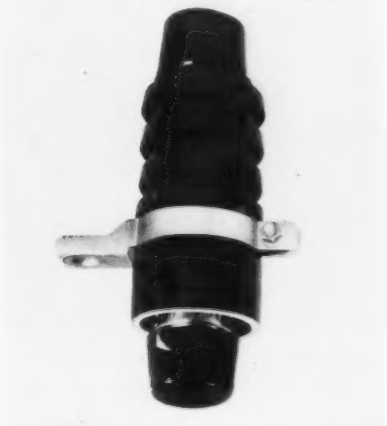
Circle No. 8

Cable Puller

Greenlee Tool Co.

The Greenlee Tool Co. has announced a new lightweight electricians' cable puller weighing only 29 lb. According to this manufacturer, only 30 lb of handle pressure is required to pull 1,500 lb, thus making it an easy job for one man.

Circle No. 9



Distribution Arrester

Westinghouse Electric Corp.

A low-voltage arrester (3 to 27 kv) from this company is said to reduce impulse sparkover and discharge voltage characteristics by 20%, while its size and weight have been reduced 20%. An unusual nonexplosive dropout prevents line lockout in event of a damaged arrester.

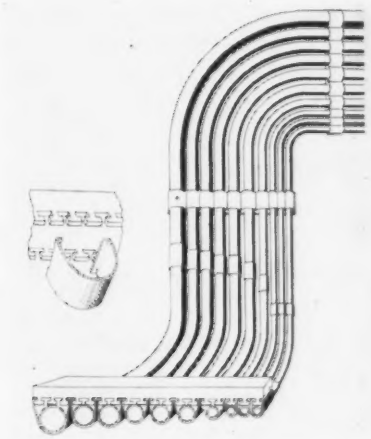
Circle No. 10

Shallow Contact Blocks

General Electric Co.

A new, single circuit, shallow contact block for use with heavy-duty, oil-tight push buttons is now available from the company's general purpose control department. The new unit is said to eliminate the costs of unused circuits in oil-tight push buttons, since only those circuits required need be purchased.

Circle No. 11



Conduit Hanger

Stamperhanger Co.

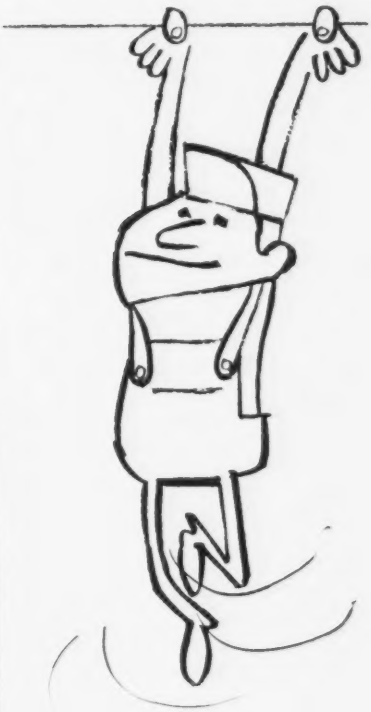
A hanger for banks of electrical conduit and pipe, designed to cut costs and improve construction features, has been announced by the Stamperhanger Co. of Oakland, Calif.

Conduit or pipe is held against a channel iron by spring alloy aluminum clamps, which slide over the pipe and are held by slots in the channel. A cam on the clamp holds it in place. Installation or removal of clamps is simple and fast.

Circle No. 12

For More Product Information Fill in Coupon on Page 100

don't hang by your thumbs

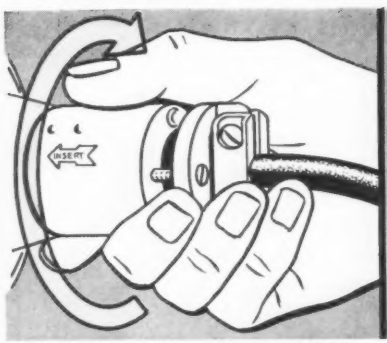


but it will pay you to wait for the big news in distribution transformers

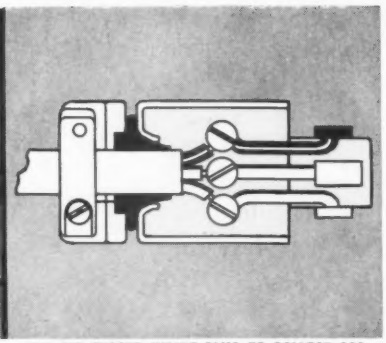
LL-65

coming soon from Westinghouse

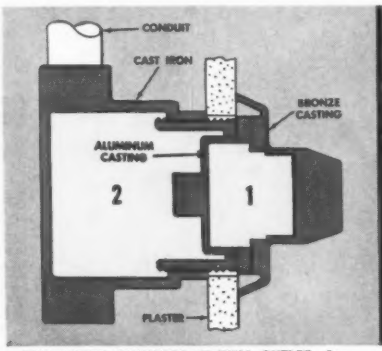
J-70963-1



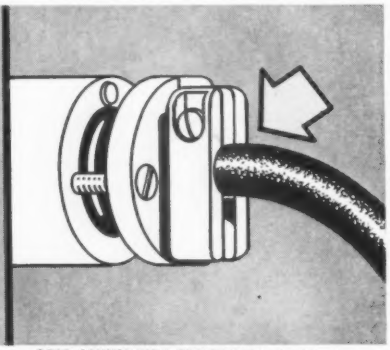
NO ARCING WHEN PLUGGING OR UNPLUGGING. Outlet is electrically "dead" until plug is inserted and rotated 22-25°. Reverse turn disconnects current before plug is removed. Spring pressure and keyed construction prevent accidental disconnection.



NO AIR SPACES INSIDE PLUG TO COLLECT GAS OR MOISTURE. After plug is wired to cord, electrician pours a self-hardening insulating resin into all air spaces. Interior of plug becomes solid, water-tight, vapor-tight mass.



TWO SAFETY CHAMBERS IN WALL OUTLET. Gas-tight chamber No. 1 (bronze and aluminum castings) contains and seals off switching mechanism. Cast iron chamber No. 2 keeps minor internal explosions from spreading to room.



CORD CANNOT PULL OUT OF PLUG. Double-clamping cord-grip relieves strain on plug terminals. And because terminals and wires are completely embedded in insulating resin, connections cannot loosen to cause arcing.

NEW

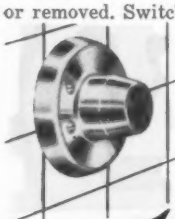
EXPLOSION-PROOF

RECEPTACLE AND PLUG

FOR CLASS I, GROUP C OR D, ATMOSPHERES

The Hubbellock Explosion-Proof Receptacle and Plug prevent arcing when electrical connections are made or broken in explosive atmospheres. No special wiring is required for installation in new or existing structures.

There are no air spaces in the plug where explosive gases can collect. No current can flow to the receptacle contacts while the plug is being inserted or removed. Switching takes place inside a vapor-sealed safety chamber of heavy bronze and aluminum castings.



Any 20-ampere, 125-volt, 60 cycle A.C. appliance may be operated from the receptacle by substituting the Hubbellock Explosion-Proof plug for the present plug. Appliances equipped with the Explosion-Proof plug will also operate in conventional 3-wire Hubbellock receptacles.

Plug and receptacle are listed by Underwriters' Laboratories and are described by the National Fire Protection Association for use in Class I, Group C or D, explosive atmospheres. They are ideal for hazardous industrial areas and for hospital operating and delivery rooms.

Write now for detailed specifications and prices.

"Hubbellock" is a registered trademark of Harvey Hubbell, Inc.

EXPLOSION PROOF *Hubbellock*® WIRING DEVICES

HARVEY HUBBELL, INCORPORATED • BRIDGEPORT 2, CONNECTICUT In Canada: Scarborough, Ontario

Conduit Protectors

Harvey Aluminum Co.

Fully capped threads are now standard for the complete line of Harvey Aluminum rigid conduit that offers electrical contractors a range of sizes ½ in. to 6 in. in the lightweight, corrosion-resistant aluminum conduit.

Conduit lengths are now furnished with closed-end plastic caps, protecting the interior as well as the threads from damage, dust and dirt in storage and handling. More firmly seated than conventional protective rings, the new feature can be detached and reused on the job as a plug shield against paint, plaster and work rubbish. The caps are color coded.

Circle No. 13

Fuse Cutout

Hubbard & Co.

Two new 27-kv open dropout cutouts have been added to the Hubbard & Co. Faultmaster line. These units feature the same single vent, small bore design found in other Faultmaster cutouts.

According to the manufacturer, positive operation is assured for all fault currents within the range of the cutout and safety is assured because the single confined cone of gases is directed downward and away from personnel and equipment.

Circle No. 14

For More Product Information Fill in Coupon on Page 100

Ceramic Magnets for Bushings

Lapp Insulator Co.

Lapp Insulator Co. announces a new type ceramic magnet for use in the oil level gage on the Lapp POC and POC-A line of ASA standard bushings 15 kv to 196 kv.

Two permanent-type magnets in each gage—one geared to float in the oil reservoir, and the other on the dial indicator outside the reservoir housing—activate the gage through the solid wall of the reservoir indicating the level of oil inside the bushing.

These magnets are said to be greatly improved over those previously used, which tended to demagnetize under the stress of heavy short circuit surges.

Circle No. 15

For more information, fill out coupon on page 100

BECHTEL

Power Plant Supervisor

Foreign Employment

KOREA

With at least 3 to 5 years recent experience as supervisor of operations and maintenance of steam electric generating plant with some experience in operations of a coal fired plant.

NO FAMILY HOUSING

Send resume to Personnel Manager

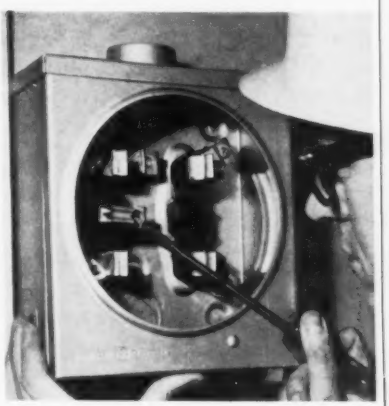
BECHTEL CORPORATION
220 Montgomery Street
San Francisco, Calif.

One-Time Fuse

Chase-Shawmut Co.

The Chase-Shawmut Co. announces its new One-Time fuse line. The manufacturer states that except for the silver plated contacts, the new product differs only in performance – not in appearance. It has long time delay, low watt loss and gives predictable performance. It is said to save power because it runs up to 38% cooler. Time current curves show that it has up to seven times the delay of ordinary fuses while meeting all applicable federal specifications for one-time fuses.

Circle No. 16



Ringless Meter Sockets

General Electric Co.

General Electric's new low priced SI-60 line of ringless meter sockets is now available for electric utility use. The socket design provides a tamperproof and weatherproof enclosure for making connections to watt-hour meters without the necessity of using a conventional sealing ring.

The socket's cover fits snugly over the meter and is held firmly in place at the top by a lip from the case, and at the bottom by a one-piece latch.

Circle No. 17

USE ELECTRICAL WEST's

annual

MANUFACTURERS'

DIRECTORY

as a handy reference and guide. It is the only directory of Western sources for electrical products and includes

Directory of Manufacturers
Where-to-Buy Products Directory
Directory of Representatives

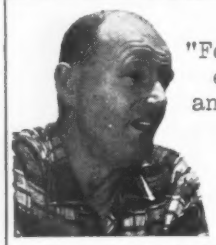
don't hold your breath

but wait a little while for the biggest news in distribution transformers in 50 years . . .

LL-65

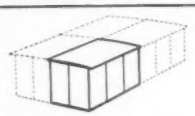
coming soon from Westinghouse

J-70963 2



"For a combination electrical field office and storage shed that's quick to move on and off the job, I like Porta House. We have them on several jobs."

Just telephone Porta House collect and get immediate delivery. Prefabricated, bolted, waterproof plywood panels—can be moved on a pick-up truck.



SIZES 6' OR MORE BY 9' OR MORE.

PORTA HOUSE

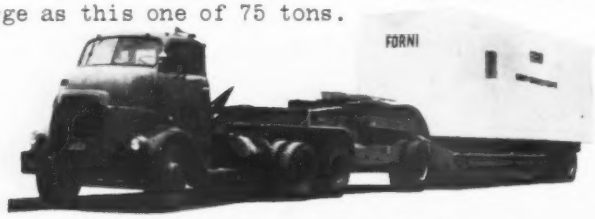
Ridgely K. Dodge 6767 Broadway Terrace, Oakland, Calif.

Phone collect for immediate delivery: OLympic 2-7237

Distributor (Sales & Rentals): Porta House, 8833 So. Alameda St., Los Angeles 2 • LUdlow 3-1301

NO MATTER HOW BIG . . .

Before you cast-in-place, be sure to check the advantages of precast concrete vaults. They're economically feasible even as large as this one of 75 tons.

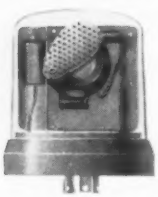


Forni Division, **CHRISTY CONCRETE PRODUCTS, Inc.**

6150 Hollis Street Emeryville 8, California OLympic 8-7070

PRECAST VAULTS • ELECTRICAL PULL BOXES • SERVICE BOXES • TRANSFORMER KIOSKS • MANHOLES

FOUND!



How To Keep Street Lights Burning

Take a simple, lightweight, compact photo control. Use Varistors in conjunction with the secondary lightning arrester.

RESULT: You eliminate the one biggest cause of photo control failure... transient voltage surges which are *below* the spark-over of lightning arresters.

That's LUMATROL MARK I...completely reliable! It withstands ALL transients up through the capability of the secondary arrester!

WRITE FOR BULLETIN 91a.

MICRO BALANCING, INC.
GARDEN CITY PARK, N.Y.

In Canada: J. R. KEARNEY CORP.
Box 270, Guelph, Ont.

TESTS PROVE:

10% more slip

with **Y-ER EAS**

Wire Pulling Lubricant

For Lead, Rubber, Braid or Synthetic Covered Cables

There is only one Y-ER EAS

Don't accept substitutes. The extra slip means extra savings on every job.

- Creamy, non-corrosive. Never greasy or messy.
- Prevents sticking or setting. Extra slip for saddles and turns.
- Does not run back on cables.
- Never harmful to hands, clothing, cables or conduit.

NEW! ALUM-N-EAS

Thread lubricant stops binding of aluminum conduit connections!

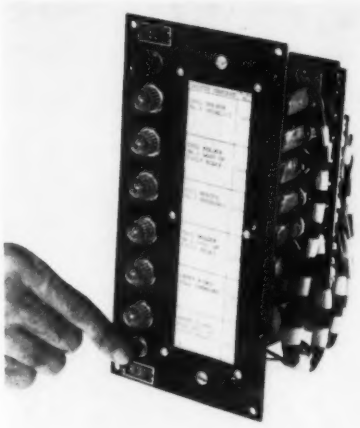
Write for descriptive literature

UL

At all Leading Electrical Supply Houses

ELECTRO COMPOUND CO.

4148 W. 150th St., Cleveland 35, Ohio

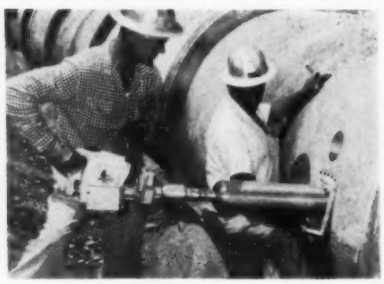


Static Fault Finder

Clark Controller Co.

This company announces a new device for automatically indicating the location of faults and malfunctions in electrical control equipment. The design is said to feature static magnetic-type switching and memory-type operation which suits it for detecting open contacts in protective or emergency stop circuits.

Circle No. 18



Rotary Hammer

Demo Tool Corp.

Because of the demand for independent power on location, a new portable gasoline rotary hammer, using shock waves for drilling rock, reinforced concrete or masonry, has been added to the portable electric and portable air rotary models manufactured by the Demo Tool Corp. of Santa Monica, Calif.

Powered by a heavy-duty McCulloch gasoline engine, the new model develops 40,500 shock waves and 8,250 impacts per minute that cut clean, true holes.

Circle No. 19

For more information on products, fill out coupon, page 100

Short Stem TELEPHONE and DUPLEX NOZZLES

Shorter styled, modern, flanged duplex telephone and receptacle nozzles in satin brushed brass or anodized aluminum. Standards fit ½" opening. ¾" stems available. Also grounded receptacles.

Adjustable
STEEL BOX

This is our #190 series, with a 3¼" brass cover plate. Comes in two standard heights—3⅛" and 2⅜" minimum. Designed for power or telephone service. A "KEY" (shown in center of photo below) which fits most popular size and style receptacles has been added at no extra cost.

Adjusting ring for our 190 series is so designed that KEY drops easily into special slots. You select the receptacle required and simply "LAY-IN"; then "LAY-ON" receptacle ring. That's it.

FULLMAN MANUFACTURING CO.
LATROBE . . . PENNSYLVANIA

ELECTRICAL CONTRACTORS:

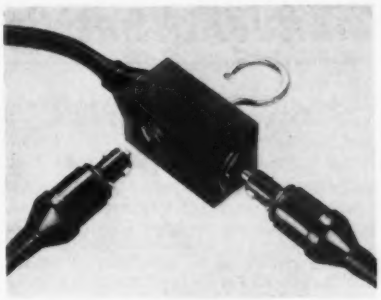
You waste a lot of time and money bidding on many jobs you do not get. This costly waste cuts deeply into your profits and you do not make the money you should.

We can furnish you excellent electrical estimating service at a saving of over 50% of your present estimating costs. We can furnish you take-offs and man hours only, or we can furnish complete estimates showing detail lists of materials, at current unit prices, and man-hours and labor costs, together with a detailed list of overhead items and profit.

You can check each item of our estimate and compare it with your own. Thus you get the benefit of two independent estimators in the preparation of your bids, all at a definite saving in estimating cost.

Call us for complete information: without obligation of course.

LeROY
CONSTRUCTION SERVICES
UN 1-2483
768 Brannan Street San Francisco 3



Explosionproof Plugs

J. B. Nottingham & Co. Inc.

Explosionproof plugs and receptacles for safe, rapid connection and disconnection of permanent or portable electric lighting and power distribution systems in hazardous areas have been introduced by J. B. Nottingham & Co. Inc.

Approved by the U. S. Navy for areas where Saran plastics work is being done, the new line of plugs and receptacles may be used with two-, three- or four-wire circuits rated as high as 240 v, 15 amp or 120 v, 30 amp. Plug and receptacle contacts of electrical grade copper are solidly encased in neoprene.

Circle No. 20

Vibration Counter

Herman H. Sticht Co.

Herman H. Sticht Co. of New York announces the availability of the Jaquet vibration counter.

Said to be one of the simplest and most reliable vibration recorders on the market, the Jaquet vibration counter will ascertain whether transmission lines are subject to vibration and the amount of vibration. The counter responds to all amplitudes above 0.03 in. in the frequency range of five to 50 cycles per second. Vibrations up to 100 cycles per second can be registered.

Circle No. 21

don't jump

at the first chance when you buy distribution transformers . . . wait until you've heard about the really new

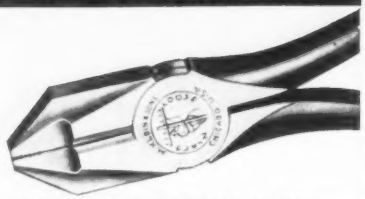
LL-65

coming soon from Westinghouse

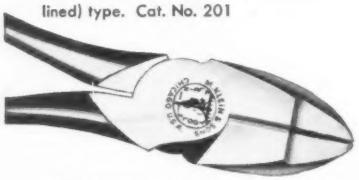
J 70963 3

KLEINS

for LINEMEN and ELECTRICIANS



The Original Klein Side Cutting Plier—Also available in NE (Streamlined) type. Cat. No. 201



High Leverage Plier—Extra high leverage permits cutting extremely tough wire. Also available in the standard type as shown above. Cat. No. 213-9NE

High Leverage Oblique Cutting Plier—A recently introduced plier designed to cut toughest wire. Cat. No. 228-8

Electrician Conduit Plier—Reams inside and outside of conduit, tightens lock nuts in outlet boxes. Cat. No. 333-8

"Since 1857" the name Klein has stood for the finest in tools and equipment for linemen and electricians. It is the uncompromising high quality back of the name Klein that has won Klein Pliers their place in the hands of men who know good tools. Klein Pliers are now available in a wider variety of styles and sizes than ever before. Be sure the pliers you need carry the Klein trade-mark.

Klein Catalog Free—This new Klein catalog giving complete information on Klein tools and equipment for linemen and electricians will be sent on request. Write for your copy.

Ask Your Supplier—Foreign Distributor: International Standard Electric Corp., N.Y.

Mathias KLEIN & Sons Established 1857 Chicago, Ill., U.S.A.
7200 McCORMICK ROAD • CHICAGO 45, ILLINOIS

MANUFACTURERS' LITERATURE

For fast action in securing the manufacturers' literature listed below and more information on new products described in the preceding pages, use the coupon below. Circle the items wanted and mail to Electrical West

HAZARDOUS LOCATIONS—Crouse-Hinds' bulletin 2722 discusses the company's Condulets and the National Electrical Code. This 60-page publication tells about applications of Condulets in hazardous locations. For a copy *circle No. 22 in caupon below.*

CLAMPS FOR ELECTRICAL CONDUCTORS—Designed for heavy-duty connection service under widely fluctuating loads and temperatures, Blackburn's aluminum U-bolt clamps are described in bulletin No. 6101. *Circle No. 23.*

FLOODLIGHTS—Appleton's new series of Intenso Econoflood floodlights are described in bulletin EFL-960. These five units include all five NEMA beam spreads. A dual-reflector system for stepped-up "illumen-power" is said to release more light usually trapped in the other reflector housing. Another feature is the 180° vertical swivel which allows relamping in the front from the rear, making for easier and safer maintenance. *Circle No. 24.*

FAULT INDICATORS—A four-page folder from Line Material gives application, features and ordering data on the company's fault indicators with minimum trip range between 300 and 450 amp. Cable sizes from 5/16- through 1 13/16-in. over-all diameter are accommodated. For bulletin SP3 *circle No. 25.*

EHV—Protective products and correlated programs of laboratory and field testing for power projects transmitting extra-high voltages are described in an eight-page, illustrated booklet entitled Planned Line Protection for EHV. Published by Preformed Line Products Co., the booklet tells how to employ combinations of new transmission hardware to control power losses from corona, to minimize interference with radio and TV and eliminate conductor damage from stress concentrations at suspension points and from line slapping at midspan points. For EHV-200 *circle No. 26.*

CAREER PLANNING—Addressed to young men who are or soon will be engineering graduates, a 15-page brochure entitled Your Engineering Future in Technical Marketing is available from General Electric. *Circle No. 27.*

DEVICES—A pocket-size catalog published by Holub Industries lists 12 new products available from this manufacturer. Included are specifications and descriptive information on Holub's full line of wiring devices, fuse specialties, etc. *Circle No. 28.*

TEFLON CARE—Care and installation of Teflon coated equipment is covered in a small four-page folder available from General Plastics Corp. *Circle No. 29.*

POWER PROTECTOR—New features claiming to permit safer entrance up to 480-v a-c with its LB-1 power protector are described in General Electric's bulletin GEA-6527-1. *Circle No. 30.*

PAINTS—Subox has issued a new price list effective March 1. For a copy *circle No. 31.*

BASEBOARD HEATING—Ceilheat has issued new descriptive literature on its high density baseboard with optional thermal cutout protection. A new price schedule for the entire line is also available. *Circle No. 32.*

ELECTRICAL WEST *Not good after July 1*
255 California St., San Francisco 11, Calif.

Please send me, without obligation, the new product information or catalogs.

If described in Product News, circle item number

	1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20	21
22	23	24	25	26	27	28	29	30	31	32

If described in advertising, fill in page number

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NAME ..... TITLE .....

COMPANY .....

ADDRESS .....

CITY ..... ZONE ..... STATE .....

*Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.

THEY STAY ON.....
All VICTOR "MAGIC" CLAMPS and STRAPS for Thin and Heavy Wall Conduits have this time-saving snap-on feature.

Contractors everywhere are switching to VICTOR. Cash in on this heavy demand. Add these fast selling, profitable Clamps and Straps to your line.

Write for the new Victor Strap Catalog. Lists over 600 items to fasten Wire, Cable, Tubing and Conduit

VICTOR SPECIALTIES, INC.
775 MAIN ST., NEW ROCHELLE, N.Y.

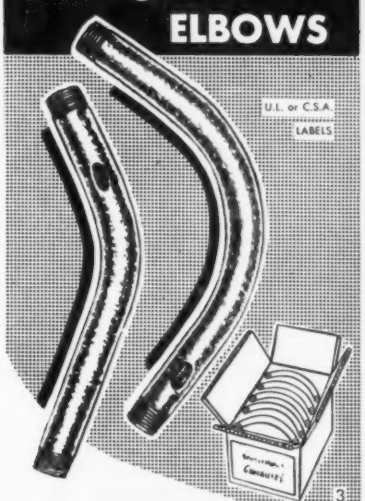
The Greatest Single Source for Clamps and Straps

California Representatives:

STANLEY SALES CORP.
1122 Folsom Street
San Francisco 3, Calif.
Phone: UNderhill 3-8900

HAYJAX COMPANY
436 Colyton Street
Los Angeles 13, Calif.
Phone: MA 8-5256

Standard Radius
RIGID *Conduit* ELBOWS



ALUMINUM
Black Enameled
Hot Dip Galvanized

CONDUIT NIPPLE MFG. CO.
1455 SPRING GARDEN AVE. PITTSBURGH 12, PA.

LATE NEWS

Continued from p 85

► **Light and Color in Merchandising**—a presentation by the lighting sales department of Portland General Electric Co.—has been making the rounds of the luncheon clubs and women's organizations in Portland, Salem, St. Helens and even in some PUD territories. On the crew staging the demonstrations and talks are Theron Fitch, Dell Maulding and Bob Kallen.

► Another **Academy of Lighting Arts** for residential lighting started April 10 under the sponsorship of the Sacramento Municipal Utility District and the Illuminating Engineering Society, Mother Lode Section. It will continue in a 10-session series through June 19. Clarence Epling and Pat Carew of SMUD conduct these classes.

► **The second Apprenticeship Teachers Institute** for those who conduct electrical construction apprentice training in California was successfully run March 27-31 in San Jose. A review of the standards by which the classes are conducted was held and it was the consensus that the course be upgraded to give apprentices more training, especially in the new products and in electronics. The Santa Clara-San Benito Industry Council was host to the course.

► Two Westerners are programmed on the **Electrical Apparatus Service Assn.** (formerly NISA) annual convention, at the Jack Tar Hotel, San Francisco, June 11-14. John C. Reed, president, Reed Electric Co., Portland, co-owner of one of the largest electrical service shops in the Northwest, will describe establishing his business in an area where most of the service work previously had been done by manufacturers' shops. Charles W. Doane, sales manager, Larsen-Hogue Electric Co., Los Angeles, will talk on "Building a customer relations team." Three other of the nation's most prominent service shops executives are also on the program, together with four officers of major electrical manufacturing firms, an equipment distributor, an educator and an office methods expert. The convention will also feature an exhibition of products and equipment pertinent to the service shops. The general chairman for the convention is Jack Van Alstyne of Sacramento, aided by a large local committee.

hold on, there!

you haven't heard the best news in distribution transformers until you get the whole story about the

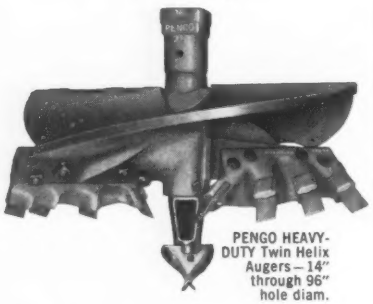
LL-65

coming soon from Westinghouse

J 70963 4

PENGO AUGERS

Save you money 4 ways



PENGO HEAVY-DUTY Twin Helix Augers—14" through 96" hole diam.

1 **BORE FASTER**...put real "teeth" in earth drilling, save wear and tear on your diggers.

2 **STAY ON THE JOB LONGER** ...all wearing parts replaceable in the field; no down-time for shop welding.

3 **COST FAR LESS TO MAINTAIN** ...reversible teeth cost only 90¢ each, pilot bit only $8.00. Parts interchangeable on all PENGO augers you are using...less inventory!

4 **A SIZE AND TYPE FOR EVERY BORING JOB**...Augers and boring heads (for welding to your present auger) available for every make of machine from post hole diggers to largest heavy-duty earth drills. Write for catalog.

PENGO Prope®

—the most satisfactory construction rope available today!

* GREAT STRENGTH (8,200 lbs. for ¾" diameter)
* LIGHT WEIGHT (11 lbs. per 100 ft. ¾" diameter)
* HANDLES AND SPLICES LIKE MANILA in any climate or weather
* WATERPROOF (even salt water); can't mildew or rot. Excellent dielectric properties.

PENGO-Prope is a synthetic rope of special construction available in all popular diameters from 7/16" to 2"; regular construction in sizes smaller than 7/16". Write for specifications, prices.

PETERSEN ENGINEERING COMPANY, INC.
Santa Clara, California
Axminster 6-7712

Proposed Western Projects

Pacific Southwest

Anaheim, Calif., Nortronic Div., Northrop Corp., engineering and administration building, $1,700,000. Plans by Daniel, Mann, Johnson & Mendenhall, Los Angeles; Honnold & Rex, consulting architects.

Bakersfield, Kern County Union High School & Junior College Dist., science unit, Bakersfield Junior College, $1,000,000. Plans by Wright, Metcalf & Parsons.

Beverly Hills, Boyar-Kessler Investment Co., office, $1,200,000. Kite & Overpeck, architects.

Beverly Hills, S. Jon Kreedman & Co., office, $8,500,000.

Chula Vista, Sweetwater Union School Dist., high school, $2,550,000. Plans by Kistner, Curtis & Foster, San Diego.

Hollywood, Ardmore Development Co., 13-story apartment, $5,700,000.

La Habra, Duane Co., 121 stucco dwellings, $1,738,610.

Lompoc, Vandenberg Air Force Base, 270 units housing, $4,455,000. Plans by Hugh Gibbs, Long Beach.

Los Angeles, Board of Education, junior high school, $2,700,000. Plans by Smith, Powell & Morgridge.

Los Angeles, Board of Education, Franklin High School addition, $2,300,000. Plans by Weston & Kline.

Los Angeles, Pacific Southwest Realty Co., bank addition, $1,500,000. Plans by Albert C. Martin & Associates.

Los Angeles, Board of Education, Birmingham Junior High School, $2,885,000. Plans by Deasy & Bolling; J. E. Byers, consulting engineer.

Los Angeles, L. A. County, music center, theater and forum, $23,645,000. Plans by Welton Becket & Associates.

Orange City, city hall, $1,250,000. Plans by Welton Becket & Associates, Los Angeles.

Palm Springs, Doran May, motel-apartments and convention center, $3,000,000. Plans by Armet & Davis, Los Angeles.

Pt. Mugu, 11th Naval Dist. Public Works Office, San Diego, 200 units housing, $3,300,000. Plans by Hugh Gibbs & Associates, Long Beach.

Santa Ana, John B. Clark, 93 stucco dwellings, $2,017,000. Thomas & Richardson, architects.

Santa Fe Springs, Safeway Stores Inc., warehouse and repair shop, $1,609,000.

Twentynine Palms, 11th Naval Dist. Public Works Office, San Diego, 100-unit housing, $1,650,000. Plans by Palmer & Krisel, Los Angeles.

Westminster, Robert H. Grant, 110 dwellings, $1,100,000; 189 dwellings, $1,890,000. Earl G. Kaltenback Jr., Anaheim, architect.

Alaska and Hawaii

Anchorage, Alaska, Lathrop Co. and Lease Co., office, $4,000,000.

Juneau, Stone & Schulte Realtors, 100 homes, $2,000,000.

Ketchikan, City, expansion of electric power system, $1,300,000.

Honolulu, Hawaii, Peoples Investment Co., cultural center, $5,000,000.

Pacific Northwest

Vancouver, B. C., A. H. Clary & Associates, hotel, $1,000,000. Plans by Dirassar & James.

Vancouver, University of B. C., winter sports arena and student union building, $1,250,000. Plans by Thompson, Berwick & Pratt.

White Rock, Semiahmoo Development Co., airport and recreational center, $10 million. Plans by Scott, Furnadjieff & Johnstone, Vancouver.

Carmel, Calif., Carmel Valley Manor, rest home, $4,000,000. Plans by Skidmore, Owings & Merrill, San Francisco.

El Cerrito, R. E. Meadows, 50 homes, $1,250,000.

Fresno, owner, motel and dining facilities, $1,200,000. In care of Edward Charles Merlo, San Mateo.

Hayward, Kaiser Foundation, medical office, $1,500,000. Plans by Clarence W. Mayhew, and August E. Waegemann, consulting engineer, San Francisco.

Los Gatos, Developments Unlimited, hospital and medical center, $1,250,000. In care of Lester L. Lynch, Los Angeles.

Los Gatos, Wedgewood Manor Inc., retirement development, $1,190,000. Plans by Vaugh L. Hunter, San Jose.

Martinez, Fibreboard Paper Products Corp., plant, $1,500,000.

Milpitas, Mobilvillage Inc., mobile home park and recreational facilities, $2,000,000. Plans by Theodore R. Moist, Oakland; J. Y. Long Co., Oakland, engineers.

Monterey, Monterey Savings & Loan Assn., bank, $1,000,000. Plans by Skidmore, Owings & Merrill, San Francisco.

Napa, Randolph Parks, shopping

center, $1,500,000. Plans by Robert M. Keenan.

Oakland, 1200 Lakeshore Inc., 16-story apartment, $7,000,000. In care of Simpson, Stratt & Associates, San Francisco, architects.

Placerville, El Dorado Union High School Dist., school, $2,000,000.

Sacramento, Sacramento-Yolo Port Dist., port facilities and relocation of existing facilities, $9,850,000. A. F. Benscheidt, Long Beach, consulting engineer.

San Francisco, Eichler Homes Inc., 15-story apartments, $6,000,000; six three-story garden apartments, $1,000,000. In care of Claude Oakland, architect; P. Q. Chin & Hensolt, consulting engineer.

San Jose, Good Samaritan Hospital, hospital, $3,500,000. Plans by Anshen & Allen, San Francisco, and L. D. Price, Sunnyvale.

Santa Clara, Eichler Homes Inc., apartments, $1,650,000. Claude Oakland, architect; Chin & Hensolt, San Francisco, engineers.

Sausalito, Bethel Island Yacht Haven Inc., marina, including berths, lake, shopping area, bowling alley, etc., $4,500,000. Hugh M. O'Neil, consulting engineer.

Sausalito, Norman T. Johnsen & George P. Rischmuller, apartments and marina, $1,230,000. Gunnar Andersen, San Francisco, architect.

Sunnyvale, Northern Dist. Evangelican Church, housing for aged, $1,000,000. In care of Nielsen & Moffatt, Los Angeles, architects.

Sunnyvale, Fremont Union High School Dist., school, $3,000,000. Plans by Masten, Hurd & Gwathmey, San Francisco.

Vallejo, City, marina and recreational facilities, $1,100,000. Creegan & D'Angelo, San Jose, consulting engineers.

Fallon, Nev., 12th Naval Dist. Public Works Office, San Bruno, Calif., station and radar tower, $1,200,000. Plans by Lockard, Casazza & Parsons Associates, Reno, architects.

Reno, Washoe County Board of Commissioners, medical center addition, $2,300,000. Plans by Vhay Associates.

Eugene, Ore., Board of Higher Education, humanities building, University of Oregon, $1,035,000. Plans by Stanton, Boles, Maguire & Church, Portland.

Eugene, City, city hall, $2,400,000.

Forest Grove, Pacific University, student center, chapel-auditorium, library annex, field house, swimming pool and men's dormitory, $2,400,000. Plans by Dukehart & Kinne, Portland.

Medford, General Services Administration, Washington, D. C., federal office, $2,000,000. Plans by Robert J. Keeney; and Wilmsen, Endicott & Unthank, Eugene.

Portland, Housing Authority, apartment, $3,000,000. Plans by Don Byers.

East Bremerton, Wash., Harrison Memorial Hospital, hospital, $2,500,000. Plans by R. E. Decker, Seattle, and Branch & Garrison, Bremerton.

Seattle, Housing Authority, 200-unit housing, $2,500,000. Plans by D. N. McDonald & Associates.

Seattle, Skinner Corp. and L. Smith Co., shopping center, $6,000,000; department store, $2,250,000. J. Graham & Co., consulting engineers.

Seattle, Swedish Hospital, addition, $3,500,000. Plans by Naramore, Bain, Brady & Johanson.

Wenatchee to Auburn, Puget Sound Power & Light, transmission line with receiving substation at Auburn, $7,000,000. Stone & Webster, consulting engineers.

Rocky Mountain

Boulder, Colo., State Planning Commission, library addition, University of Colorado, $1,600,000. Plans by Murphy & Mackey, St. Louis.

Colorado Springs, City, airport expansion, $1,000,000. A. J. Ryan & Associates, Denver, consulting engineers.

Denver, 811 Corp., apartment, $1,000,000. Tom Hite, architect.

Lakewood, Conservation Senior Baptists Residences, apartment, $1,200,000. In care of John Milan, Denver, architect.

Littleton, School Dist. No. 6, junior high school, $1,500,000. Plans by Alfred Watts Grant & Associates.

Billings, Mont., Yellowstone County School Dist. No. 2, schools, $3,435,000.

Billings, General Services Administration, Washington, D. C., federal courthouse and office, $6,500,000. Plans by J. G. Link & Co.

Missoula, Montana State University, dormitory, $1,000,000. Plans by Taylor, Thon, Schwartz & Kirkpatrick, Kalispell.

Albuquerque, N. M., Dale Bellamah Enterprises, shopping center, $3,000,000. Flatow, Moore, Bryan & Fairburn, architects.

Albuquerque, San Gabriel Village Sales Inc., 250 houses, $4,000,000.

Ogden, Utah, Weber County School Dist., schools, $3,200,000.

Ogden, General Services Administration, Washington, D. C., federal office, $5,470,000. Plans by Keith W. Wilcox & Associates.

heard the one about the

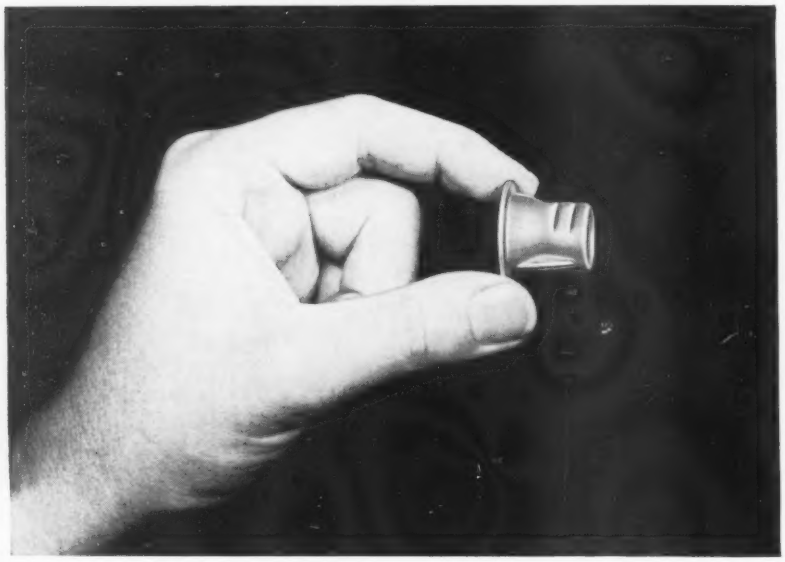
happy utility executive?
he's heard about a new
distribution transformer

LL-65

coming soon from
Westinghouse

J 70963 5

BUCHANAN pres-SURE Romex Connectors



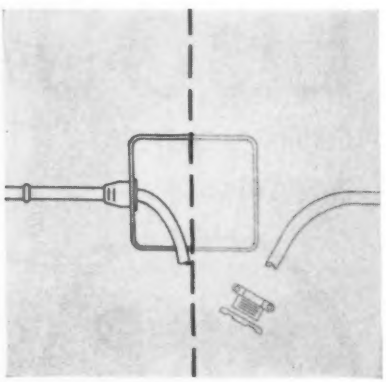
EASIEST, FASTEST TO USE

Just one piece to handle. Insert the pres-SURE Romex connector in the knockout, hold firmly against inside of box, give initial crimp with electricians' pliers, then complete crimp with 2 hand-squeeze. No screws, lock nuts or clamps to slow down your journeyman.

One man completes job first time around. Only pres-SURE Romex connectors can be inserted in boxes after wires have been run through knockouts. One journeyman can pull wires, install connectors, cut wires to proper lengths, staple wires close to boxes. No guesswork, no wasted wire, no time lost by make-up man.

Want more reasons why you should be using Buchanan pres-SURE Romex connectors? They extend less than ¼" into the box—that means more wiring room; large bearing surfaces distribute pressure on cable, minimize insulation abrasion; exclusive crimp-type installation assures permanently-tight, vibration-proof connections; no parts to work loose; special high grade aluminum won't rust.

Write for Bulletin W-5.



Listed for 14/2, 14/3, 12/2, 12/3, and 10/2 non-metallic sheathed cable. Catalog No. 1050 — An exclusive Buchanan product (U.S. Patent 2527227).

⅜" trade size fits standard ½ knockouts.

BUCHANAN

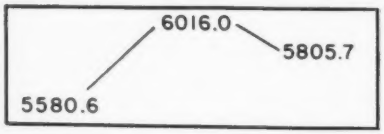
BUCHANAN ELECTRICAL PRODUCTS CORPORATION
HILLSIDE, NEW JERSEY
In Canada: ESNA CANADA LIMITED, Toronto 16

LOS ANGELES—Frank Rozema, 412 Seaton St., MA 9-3855
DENVER—Fred A. Pease Co., 4921 E. 38th Ave., DU 8-4643
PORTLAND—Keeler White-Portland, 523 N.W. Everett, CA 7-0593
SEATTLE—TAL Agencies, 1041 Sixth Ave., S., MA 3-2367

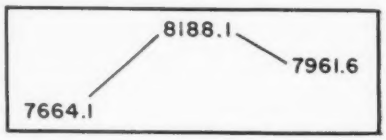
WESTERN

Economy at a Glance

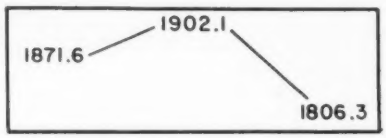
Year Ago	Month Ago	Latest Month



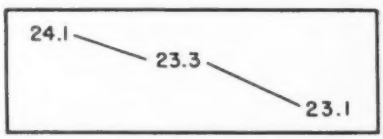
PERSONAL INCOME in millions—seasonally adjusted as of April 15 (An index of consumer spending potential)



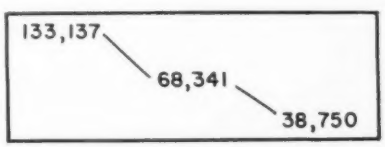
NONFARM EMPLOYMENT in thousands (Index of industrial, commercial activity)



MANUFACTURING EMPLOYMENT in thousands (A measure of manufacturing activity)



HOUSING STARTS in thousands of units (Index of new residential customers)



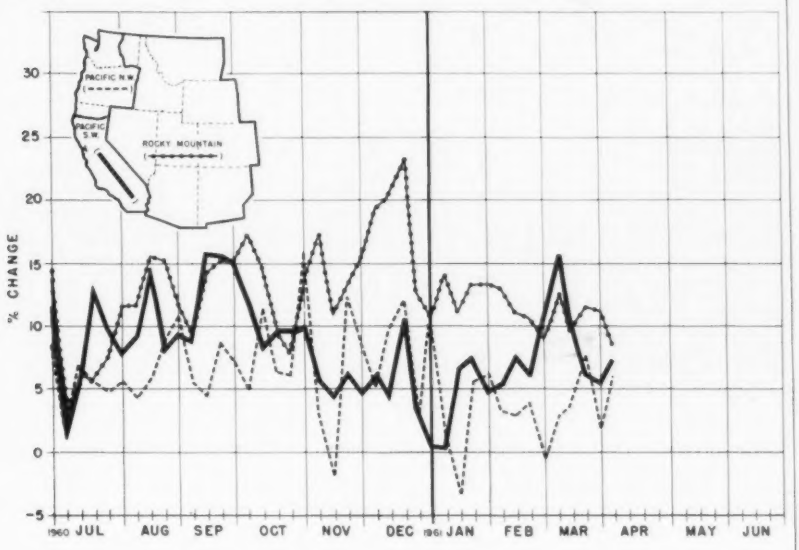
INDUSTRIAL BUILDING CONTRACTS in thousands of dollars (A rough index to the dollars of electrical contracting business six months to a year ahead)

► According to the McGraw-Hill Department of Economics, every **important economic indicator suggests that our economy has just gone through its mildest recession in the postwar period.** To illustrate this they have plotted the trend of seven key indicators during the four postwar recessions and recoveries. In general the charts show that the degree of decline in the most recent recession was milder than in past recessions, and also that the time span covered by the recession was shorter than the other three.

BUSINESS TRENDS & INDICATORS

Output Comparisons

Year-to-Year Kwh Output Changes. Per Cent Change Over Same Week One Year Ago for Region as Indicated in Keyed Map



Factors Influencing Production

According to the United States Department of Commerce, the production level of electrical transmission and distribution equipment has a direct relationship to the production of transformers, which in turn is closely aligned with electric power production and construction. Other factors influencing production are local inventories; added loads in existing structures, such as air conditioning and higher levels of illumination; age and efficiency of existing installations; and equipment damage.

An increase is expected in kilovolt amperes of transformers per kilowatt of generating capacity from 5.37 at the end of 1960 to 5.43 at the end of 1961.

RELATIVE WHOLESALE PRICES OF ELECTRICAL MATERIAL

	Previous Month	Latest Month	Year Ago
Wire and cable	128.9	128.9	141.7
Watt-hour meters	120.9	120.9	120.9
10-hp motors	135.9	132.0	154.9
225-hp motors	182.3	201.6	223.9
Hydro generators	185.5	185.5	198.5
Steam generators	203.5	203.5	203.5
15-kva transformers	133.0	133.0	133.5
50-kva transformers	131.0	131.0	141.2
500-kva transformers	137.9	137.9	154.4
Dry-type transformers	133.7	133.7	149.6
Switch and fuse panelboards	126.0	126.0	132.4
Circuit breaker panelboards	139.2	139.2	139.1
Indoor oil circuit breakers	182.5	182.5	182.5
Outdoor oil circuit breakers	156.3	156.3	211.0

SOURCE: McGRAW-HILL DEPARTMENT OF ECONOMICS

count the dollars

you can save if you'll wait for the new distribution transformer

LL-65

coming soon from Westinghouse

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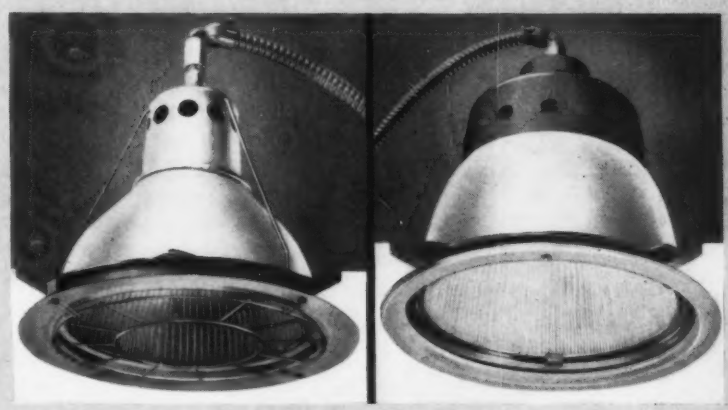

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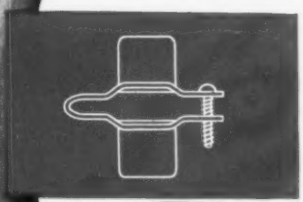

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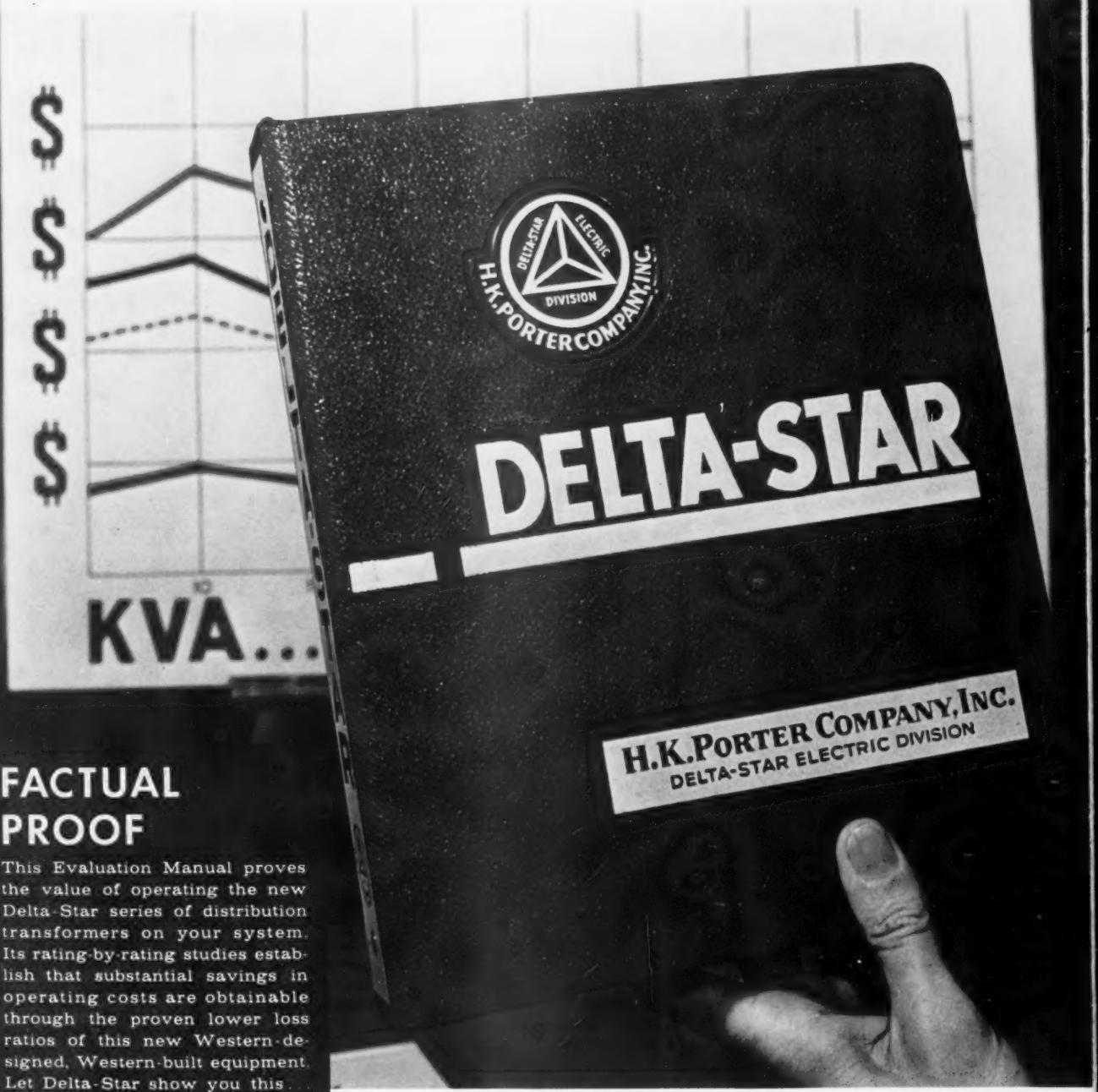

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